



RADIO TEST REPORT

Test Report No.: 33BE0311-SH-03-B

Applicant : ALPINE ELECTRONICS, INC.
Type of Equipment : KIT ASSY AVN
Model No. : BDHK222A01
FCC ID : A269ZUA142
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: November 12 to 13, 2012

Tested by: *Kenichi Adachi*
Kenichi Adachi
Engineer
Consumer Technology Division

Approved by : *Toyokazu Imamura*
Toyokazu Imamura
Leader
Consumer Technology Division



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 There is no testing item of "Non-accreditation".

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Shonan EMC Lab.

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13-EM-F0429

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SECTION 1: Customer information

Company Name : ALPINE ELECTRONICS, INC.
Brand Name : ALPINE
Address : 20-1 Yoshima-kogyodanchi, Iwaki-city, Fukushima, 970-1192, Japan
Telephone Number : +81-246-36-4111
Facsimile Number : +81-246-36-6090
Contact Person : Kenji Kuroda

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

2.1 Identification of E.U.T.

Type of Equipment : KIT ASSY AVN
Model Number : BDHK222A01
Serial Number : Refer to Section 4.2
Rating : DC 12V (typical) (DC 10V to 16V)
Country of Mass-production : China
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : November 1, 2012
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: BDHK222A01 (referred to as the EUT in this report) is a KIT ASSY AVN.

Clock frequency(ies) in the system : MCU 25MHz, RTC 32.768kHz, GPS/OSC 26MHz, ARM 27MHz

<Radio part>

Equipment type : Transceiver
Frequency of operation : 2402MHz to 2480MHz
Radio part clock frequency : 26MHz
Channel spacing : 1MHz
Type of modulation : GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna type : $1/4\lambda$ Wave Antenna
Antenna connector type : None
Antenna gain : -4.43dBi
ITU code : F1D, G1D
Operating Voltage (Radio part) : DC 2.8V
Operation temperature range : -20 deg.C to +70deg.C

FCC 15.31 (e)

This EUT provides stable voltage (DC2.8V) constantly to RF Module regardless of input voltage. Therefore, this 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 equipment complies with the antenna 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 December 23, 2014
Title : FCC 47CFR Part 15 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 revision on December 23, 2014 does not affect the test specification applied to the EUT.

3.2 Procedures & Results

| Item | Test Procedure | Specification | Remarks | Deviation | Worst Margin | Results |
|--|---|---------------------------------------|------------------------|-----------|--------------|--|
| Conducted emission | ANSI C63.4: 2009 Section 7 | FCC Section 15.207 | - | N/A *1) | - | N/A |
| Carrier frequency separation | FCC Public Notice DA 00-705 & ANSI C63.4: 2009 Section 13 | FCC Section 15.247 (a)(1) | Conducted | N/A | *See data. | Complied |
| 20dB bandwidth | FCC Public Notice DA 00-705 & ANSI C63.4: 2009 Section 13 | FCC Section 15.247 (a)(1) | Conducted | N/A | | Complied |
| Number of hopping frequency | FCC Public Notice DA 00-705 & ANSI C63.4: 2009 Section 13 | FCC Section 15.247 (a)(1)(iii) | Conducted | N/A | | Complied |
| Dwell time | FCC Public Notice DA 00-705 & ANSI C63.4: 2009 Section 13 | FCC Section 15.247 (a)(1)(iii) | Conducted | N/A | | Complied |
| Maximum peak conducted output power | FCC Public Notice DA 00-705 & ANSI C63.4: 2009 Section 13 | FCC Section 15.247 (b)(1) | Conducted | N/A | | Complied |
| Band edge compliance & Spurious emission | FCC Public Notice DA 00-705 & ANSI C63.4: 2009 Section 13 | FCC Section 15.247 (d) Section 15.209 | Conducted/ Radiated | N/A | | 2.1dB (312.019MHz, PK, Horizontal, Tx 2441MHz, 3-DH5) |

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

*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line (used battery).

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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 | RSS-Gen 4.6.1 | Conducted | - | - |

Note: UL Japan's EMI 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) | 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 |
| Radiated emission (Measurement distance: 1m) | 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

The data listed in this test report meets the limits unless the uncertainty is taken into consideration.

Antenna port conducted test

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

Conducted emissions Measurement (below 1GHz) uncertainty for this test was: (±) 1.7dB

Conducted emissions Measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Conducted emissions Measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB

Conducted emissions 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 Registration No. | 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 | 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 EMI & 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 pattern: 1100 | - |
| 20dB bandwidth | Transmitting Hopping OFF (DH5 / 3-DH5) / Inquiry, Payload pattern: 1100 | 2402MHz, 2441MHz, 2480MHz |
| Number of hopping frequency | Transmitting Hopping ON (DH5 / 3-DH5)/Inquiry, Payload pattern: 1100 | - |
| Dwell time | Transmitting (Hopping ON), Payload pattern: 1100 - DH1, - DH3, - DH5 - 3-DH1, - 3-DH3, - 3-DH5 -Inquiry | - |
| Maximum peak conducted output power | Transmitting Hopping OFF (DH5 / 2-DH5 / 3-DH5) / Inquiry, Payload pattern: 1100 - DH5 - 2-DH5 - 3-DH5 | 2402MHz, 2441MHz, 2480MHz |
| Band edge compliance & Spurious emission (Conducted) | Transmitting (DH5 / 3-DH5), Payload pattern: 1100 -Hopping ON / Inquiry -Hopping OFF | Band edge compliance: 2402MHz, 2480MHz |
| (Radiated) | Transmitting (DH5 / 3-DH5), Payload pattern: 1100 | Spurious emission: 2402MHz, 2441MHz, 2480MHz |
| 99% occupied bandwidth | Transmitting (DH5 / 3-DH5), Payload pattern: 1100 -Hopping ON -Hopping OFF | 2402MHz, 2441MHz, 2480MHz |
| <p>* As a result of preliminary test, the formal test was performed with the above modes, which had the maximum packet type / payload (except Dwell time test)</p> <p>* 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. The carrier separation may be less than 20 dB bandwidth, therefore 125mW power limit was applied to it.</p> <p>We removed 2-DH mode (2 Mb/s EDR: pi/4DQPSK) except power measurement by using 3-DH mode (3 Mb/s EDR: 8DPSK) as a representative.</p> <p>* Payload pattern worst mode was pattern "1100".</p> <p>* Power settings: Fixed Test software: bttest (= BSP ver.2.21, APP Ver.9.39 and MCU Ver.611) (for except Inquiry mode) BSP ver.2.22, APP Ver.9.39 and MCU Ver.611 (for Inquiry mode only)</p> | | |

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

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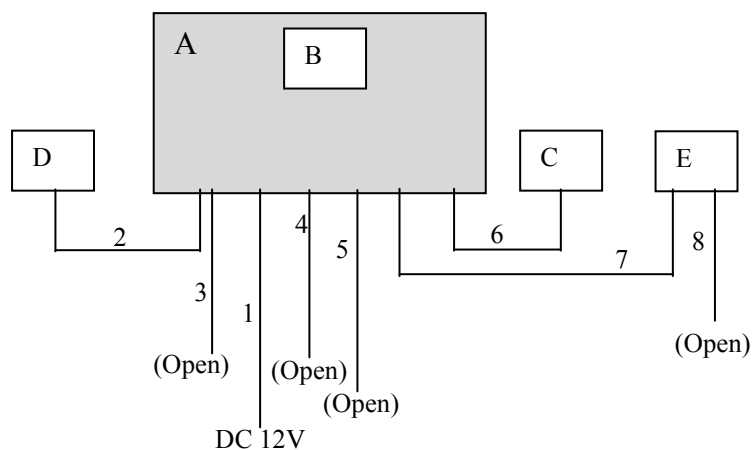
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4.2 Configuration of tested system



* Test data was taken under worse case conditions.

Description of EUT and support equipment

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|---------------|-----------------|--|----------------------------|---------|
| A | KIT ASSY AVN | BDHK222A01 | APNCTY5D12900014 *1) APNCTY5D12900015 *2) | ALPINE ELECTRONICS,INC. | EUT |
| B | Micro SD card | MMBTR04GUBCA-ME | - | Transcend | - |
| C | GPS antenna | - | - | ALPINE ELECTRONICS,INC. | - |
| D | Rear Camera | - | - | ALPINE ELECTRONICS,INC. | - |
| E | iPod Box | - | - | ALPINE ELECTRONICS,INC. | - |

*1) Used for Radiated emission tests.

*2) Used for Antenna terminal tests.

List of cables used

| No. | Cable Name | Length (m) | Shield | | Remark |
|-----|-----------------|------------|------------|------------|--------|
| | | | Cable | Connector | |
| 1 | DC Cable | 1.9 | Unshielded | Unshielded | - |
| 2 | CAMERA Cable | 7.0 | Unshielded | Unshielded | - |
| 3 | AUX Cable | 1.1 | Shielded | Unshielded | - |
| 4 | RADIO ANT Cable | 0.2 | Shielded | Shielded | - |
| 5 | USB Cable | 0.8 | Shielded | Shielded | - |
| 6 | GPS ANT Cable | 1.4 | Shielded | Shielded | - |
| 7 | IPOD Cable | 0.6 | Shielded | Shielded | - |
| 8 | 30P IPOD Cable | 0.1 | Shielded | Shielded | - |

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SECTION 5: Radiated emission

5.1 Operating environment

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

5.2 Test configuration

EUT was placed on a polystyrene platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. 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.

5.3 Test conditions

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

5.4 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 | Above 1GHz | | 20dBc |
|----------------|------------|------------------------|------------------------|----------------------------|
| Detection type | Quasi-Peak | Peak | * Average | Peak |
| IF Bandwidth | 120kHz | RBW: 1MHz VBW: 3MHz | RBW: 1MHz VBW: 10Hz | RBW: 100kHz 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 EUT was set at 30 degree as normal position according to the EUT's specification.

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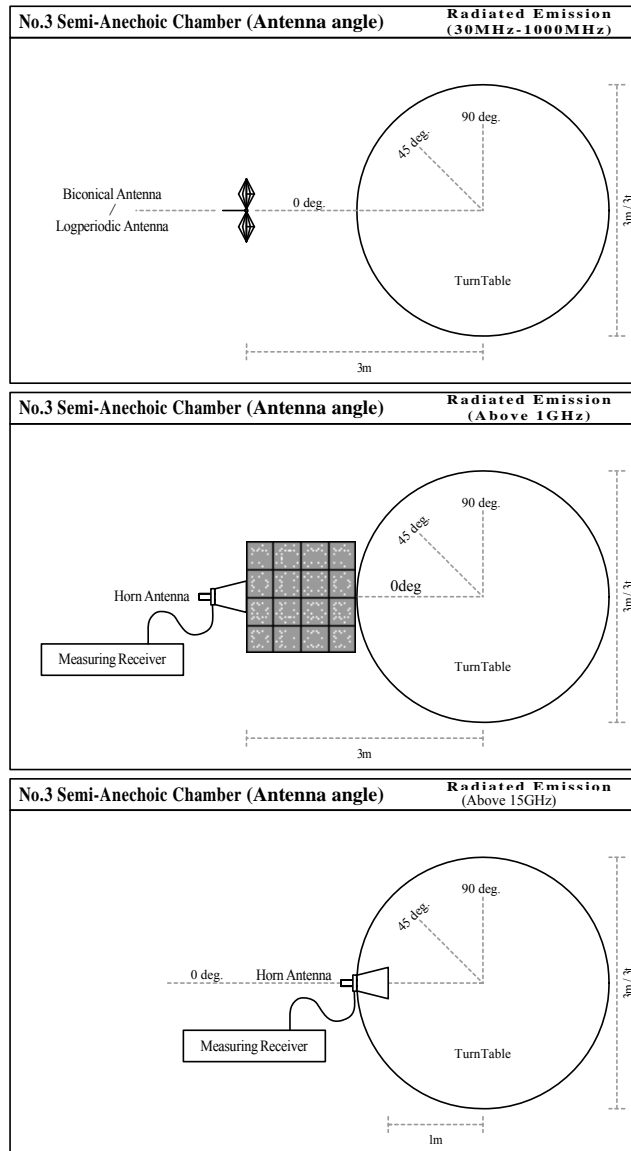


Figure 1. Antenna angle

5.5 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.

5.6 Results

Summary of the test results : Pass *No noise was detected above the 2nd order harmonics.
Refer to APPENDIX 1

SECTION 6: Out of band emissions (Antenna port conducted)

Test procedure

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

SECTION 7: 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 8: 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 9: 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 10: 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 11: Maximum peak conducted output power

Test procedure

The Maximum peak conducted output power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass
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 conducted 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

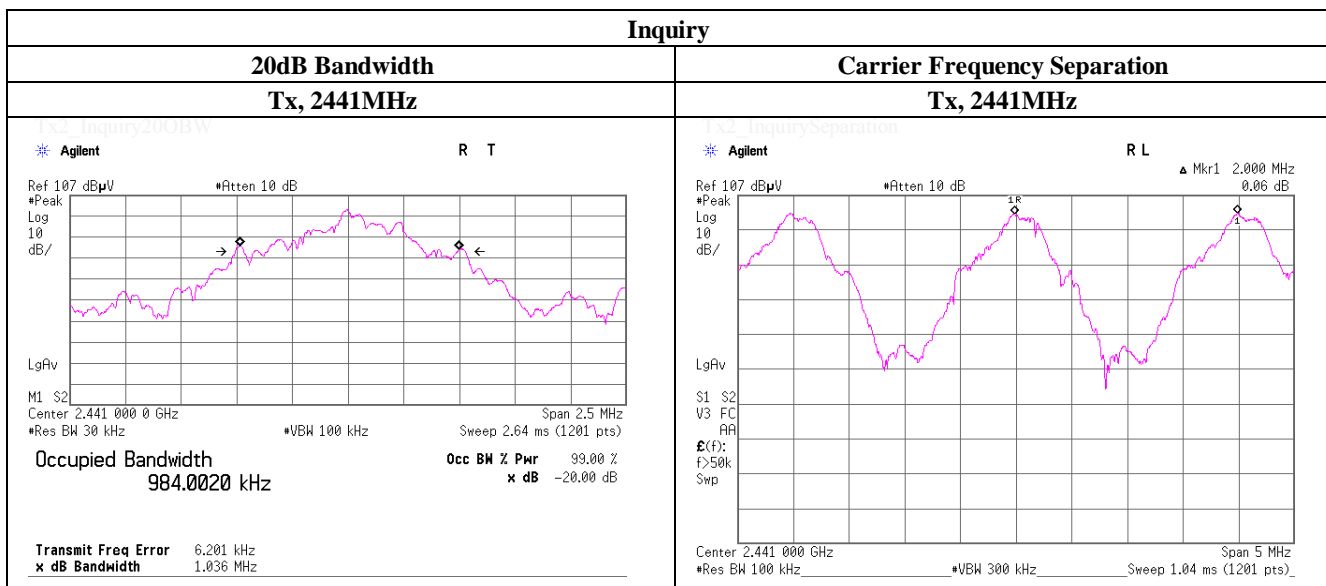
20dB Bandwidth and Carrier Frequency Separation

| | | |
|------------------------|--------------------------------|--------------------|
| Test place | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date | November 12, 2012 | |
| Temperature / Humidity | 25 deg.C , 51 %RH | |
| Engineer | Hikaru Shirasawa | |
| Mode | Tx, Bluetooth, BDR, 1100 | |

| Mode | Freq. [MHz] | 20dB Bandwidth [MHz] | Carrier Frequency Separation [MHz] | Limit for Carrier Frequency Separation [MHz] |
|---------|----------------|----------------------------|---|--|
| DH5 | 2402.0 | 0.887 | 1.000 | >= 0.591 |
| DH5 | 2441.0 | 0.910 | 1.003 | >= 0.607 |
| DH5 | 2480.0 | 0.923 | 1.003 | >= 0.615 |
| Inquiry | 2441.0 | 1.036 | 2.000 | >= 0.691 |

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

No limit applies to 20dB Bandwidth.



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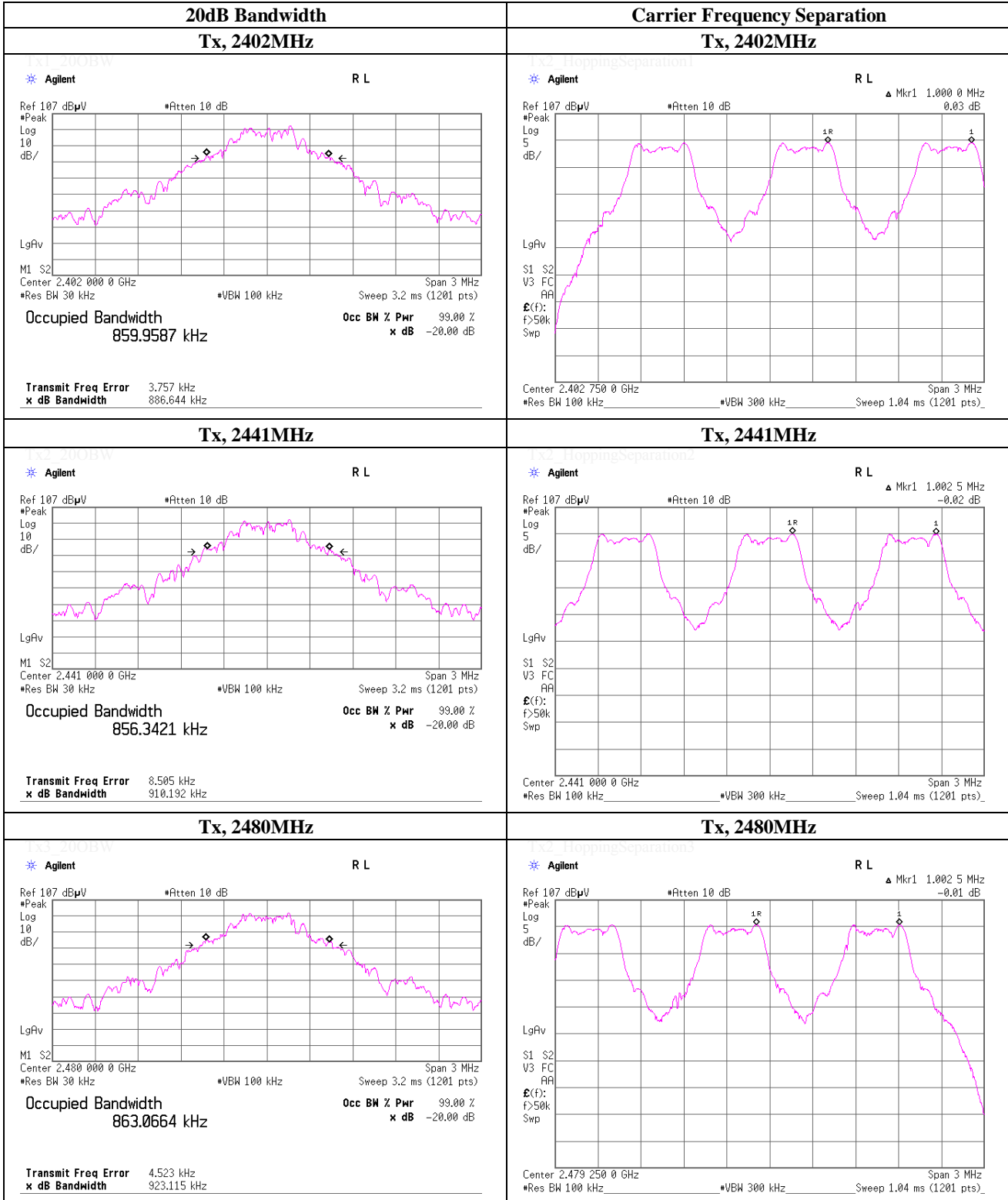
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, 1100



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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date November 12, 2012
Temperature / Humidity 25 deg.C , 51 %RH
Engineer Hikaru Shirasawa
Mode Tx, Bluetooth, EDR, 1100

| Mode | Freq. [MHz] | 20dB Bandwidth [MHz] | Carrier Frequency Separation [MHz] | Limit for Carrier Frequency Separation [MHz] |
|-------|----------------|----------------------------|---|--|
| 3-DH5 | 2402.0 | 1.182 | 1.008 | >= 0.788 |
| 3-DH5 | 2441.0 | 1.208 | 1.003 | >= 0.805 |
| 3-DH5 | 2480.0 | 1.221 | 1.000 | >= 0.814 |
| | | | | |

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

Tx2_Inquiry200BW

Tx2_InquirySeparation

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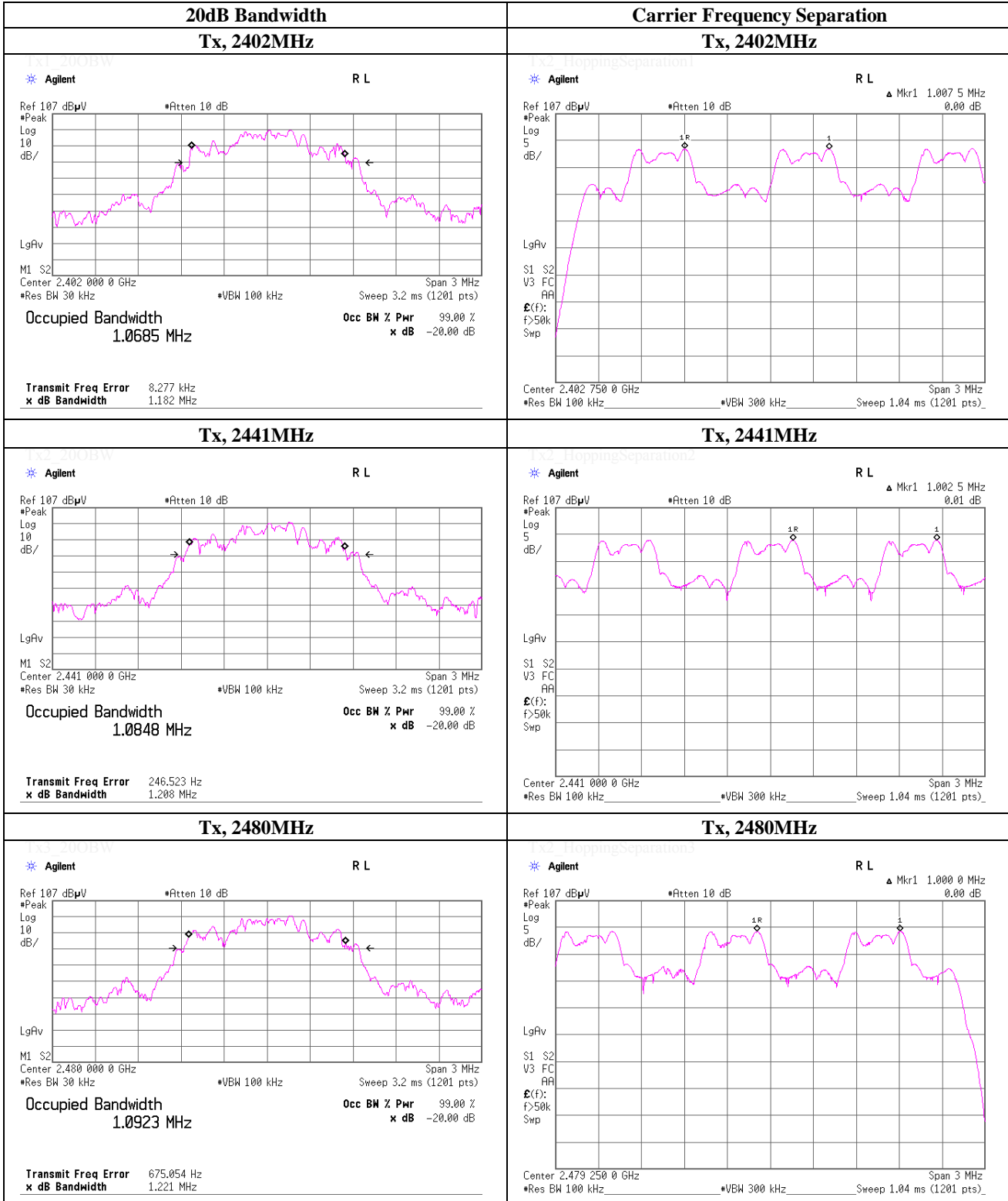
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, 1100



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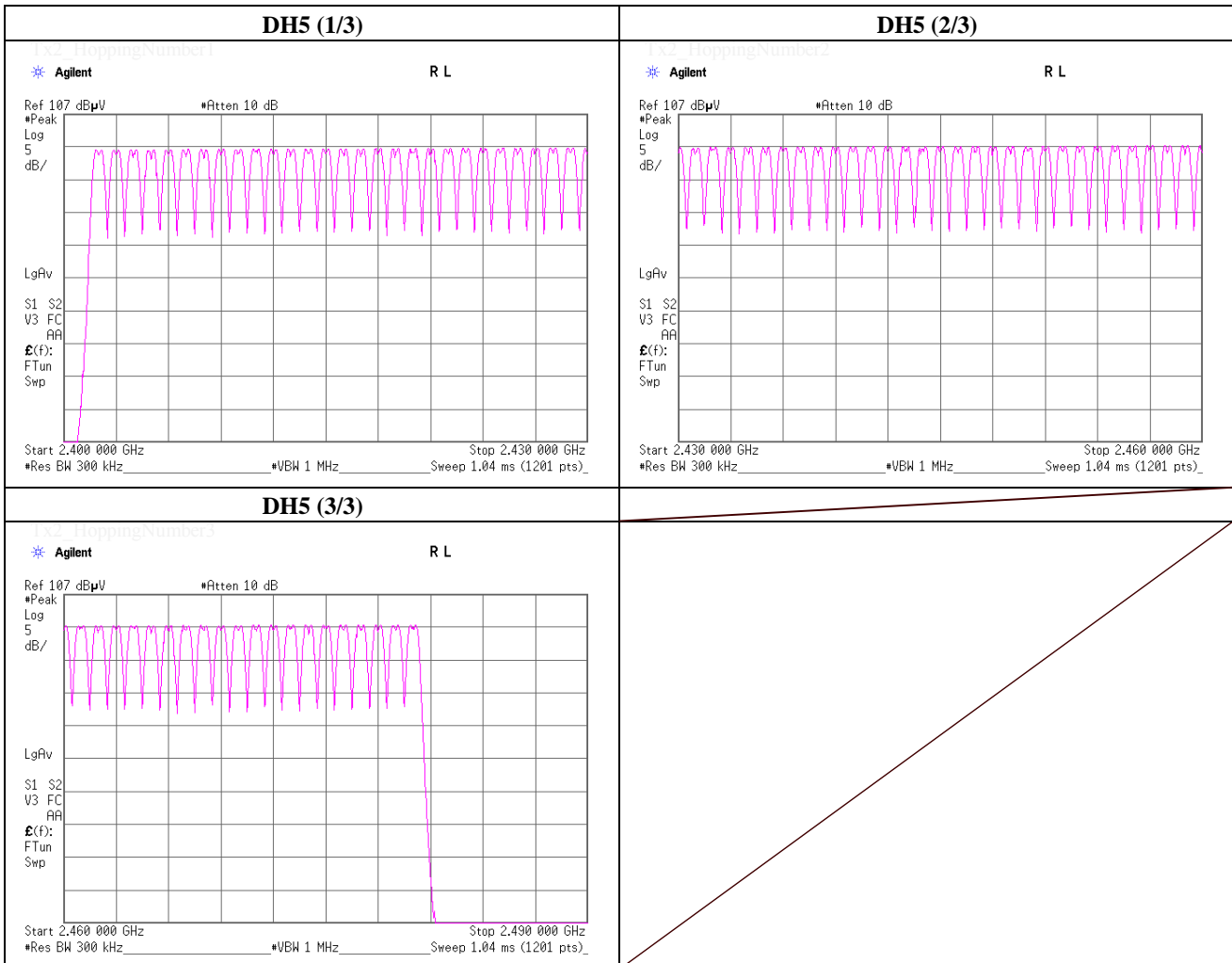
Facsimile : +81 463 50 6401

Number of Hopping Frequency

| | | |
|------------------------|--------------------------------|--------------------|
| Test place | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date | November 12, 2012 | |
| Temperature / Humidity | 25 deg.C , 51 %RH | |
| Engineer | Hikaru Shirasawa | |
| Mode | Tx, Bluetooth, BDR, 1100 | |

| 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.

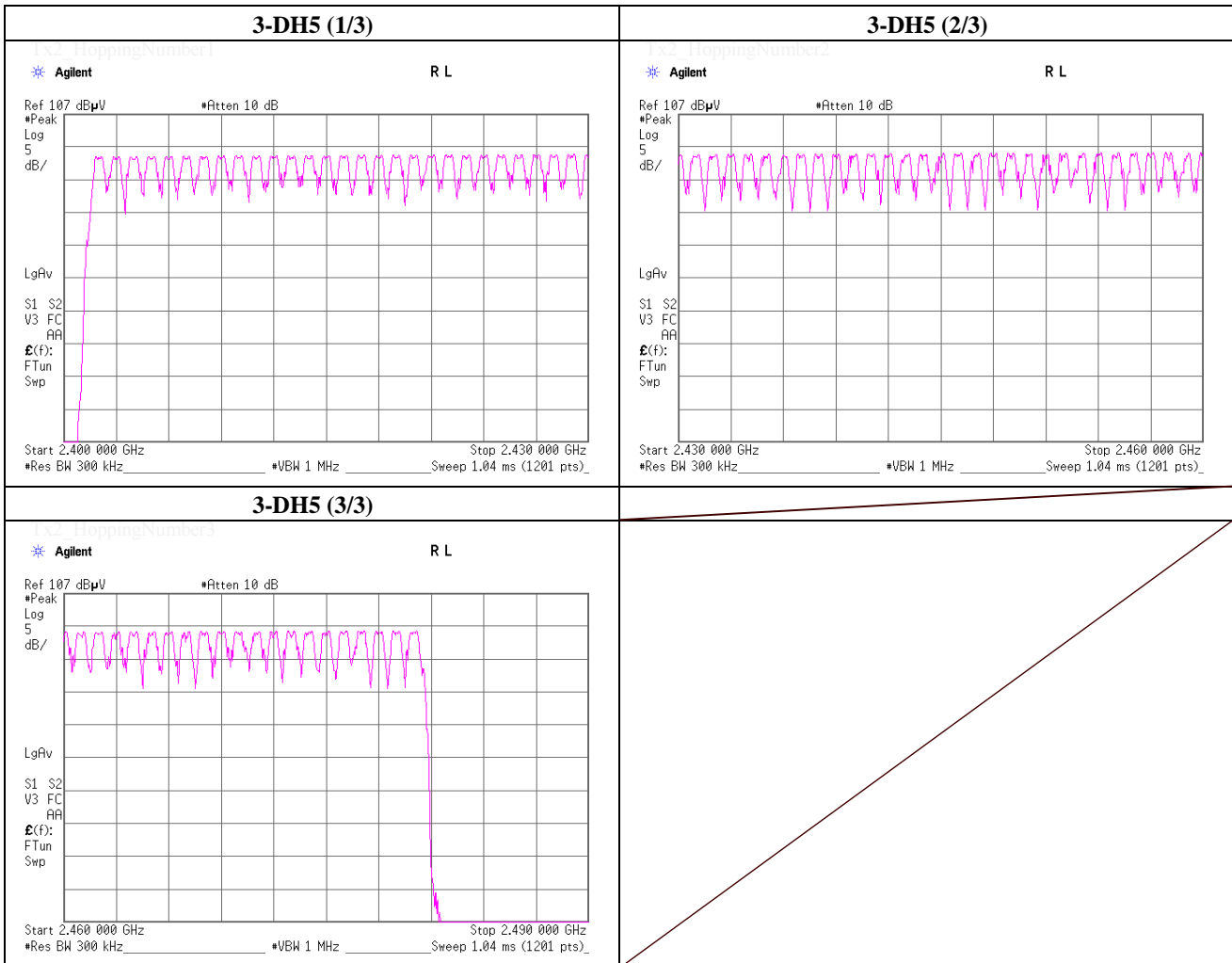


Number of Hopping Frequency

| | | |
|------------------------|--------------------------------|--------------------|
| Test place | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date | November 12, 2012 | |
| Temperature / Humidity | 25 deg.C , 51 %RH | |
| Engineer | Hikaru Shirasawa | |
| Mode | Tx, Bluetooth, EDR, 1100 | |

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

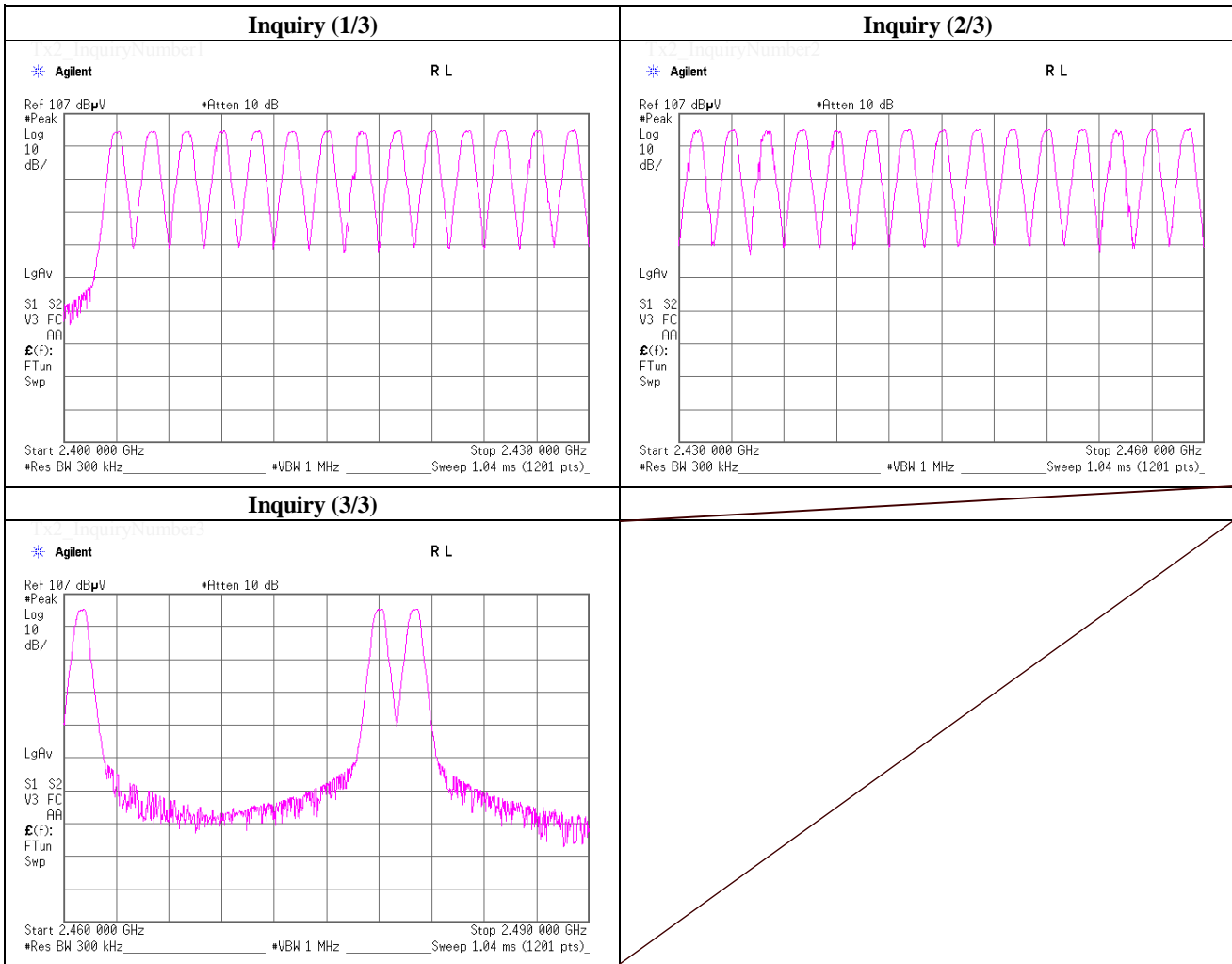
* Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.



Number of Hopping Frequency

| | | |
|------------------------|--------------------------------|--------------------|
| Test place | UL Japan, Inc. Shonan EMC Lab. | No.5 Shielded Room |
| Date | November 12, 2012 | |
| Temperature / Humidity | 25 deg.C , 51 %RH | |
| Engineer | Hikaru Shirasawa | |
| 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 November 12, 2012
 Temperature / Humidity 25 deg.C , 51 %RH
 Engineer Hikaru Shirasawa
 Mode Tx, Bluetooth, BDR, 1100

| 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 | 47.6 / 5.0 sec. x 31.6 sec. = 301 times | 0.370 | 111 | 400 |
| DH3 | 24.6 / 5.0 sec. x 31.6 sec. = 156 times | 1.626 | 254 | 400 |
| DH5 | 20.4 / 5.0 sec. x 31.6 sec. = 129 times | 2.875 | 371 | 400 |
| Inquiry | 100.0 / 1.0 sec. x 12.8 sec. = 1280 times | 0.073 | 93 | 400 |

Sample Calculation

Result = Number of transmission x Length of transmission time

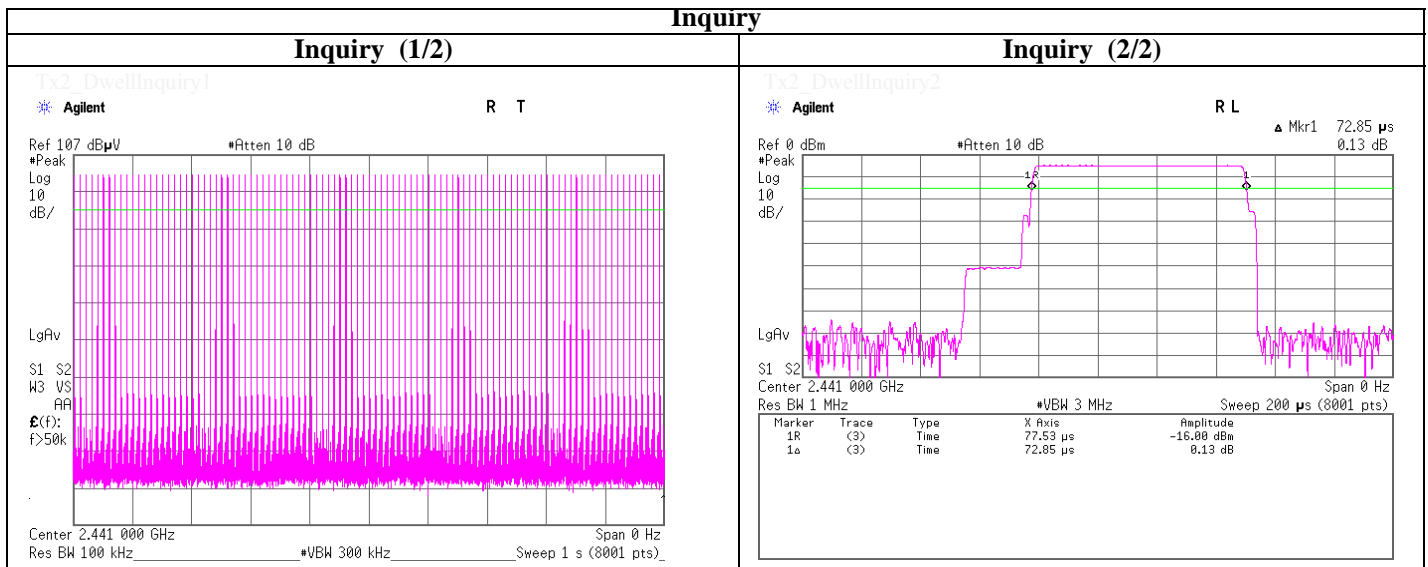
*Average data of 5 tests.(except Inquiry)

| Mode | Sampling [times] | | | | | Average [times] |
|---------|------------------|-----|-----|-----|-----|--------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| DH1 | 46 | 48 | 48 | 47 | 49 | 47.6 |
| DH3 | 26 | 25 | 24 | 23 | 25 | 24.6 |
| DH5 | 20 | 21 | 25 | 17 | 19 | 20.4 |
| 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 $N=79$.



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Shonan EMC Lab.

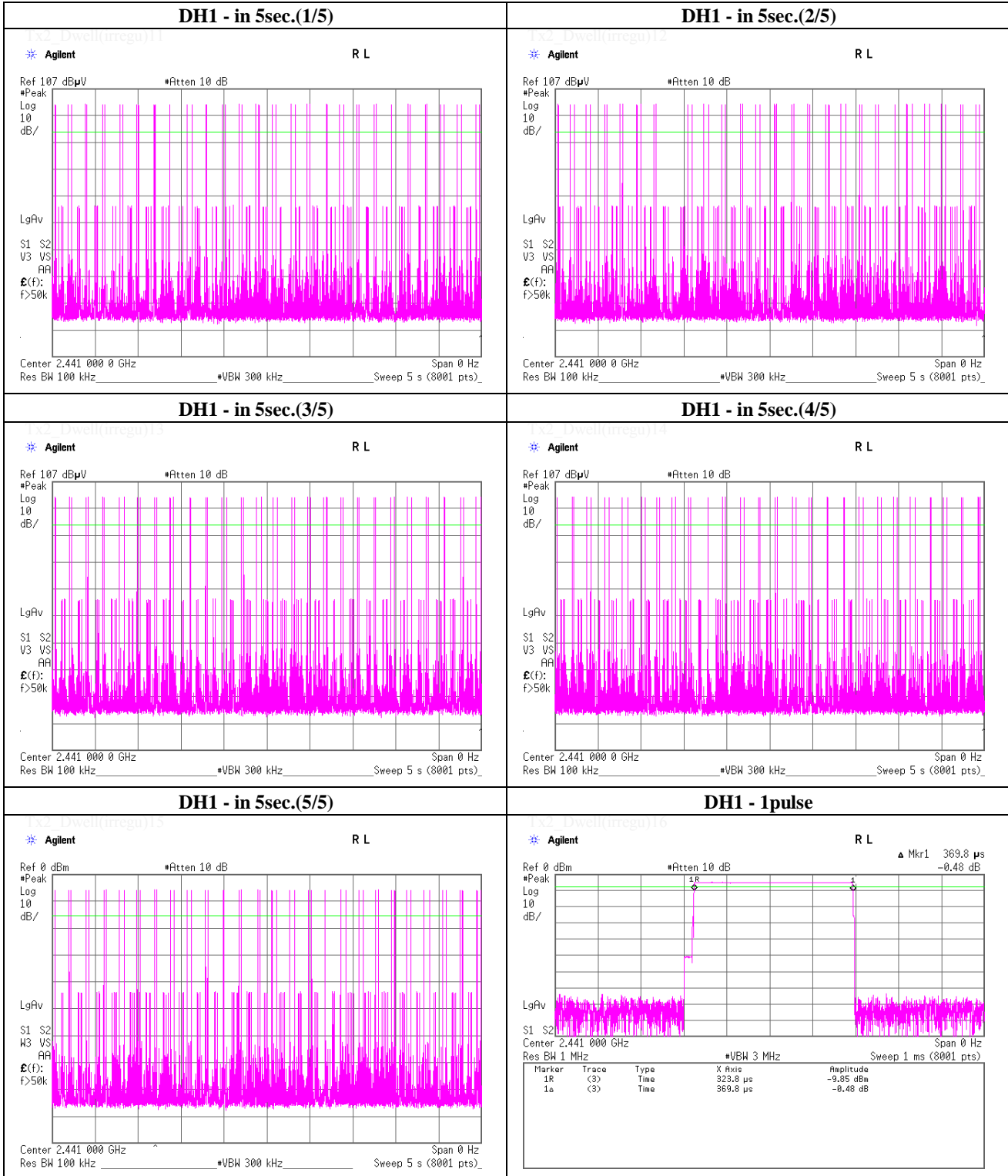
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

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Dwell time

Tx, Bluetooth, BDR, 1100



UL Japan, Inc.

Shonan EMC Lab.

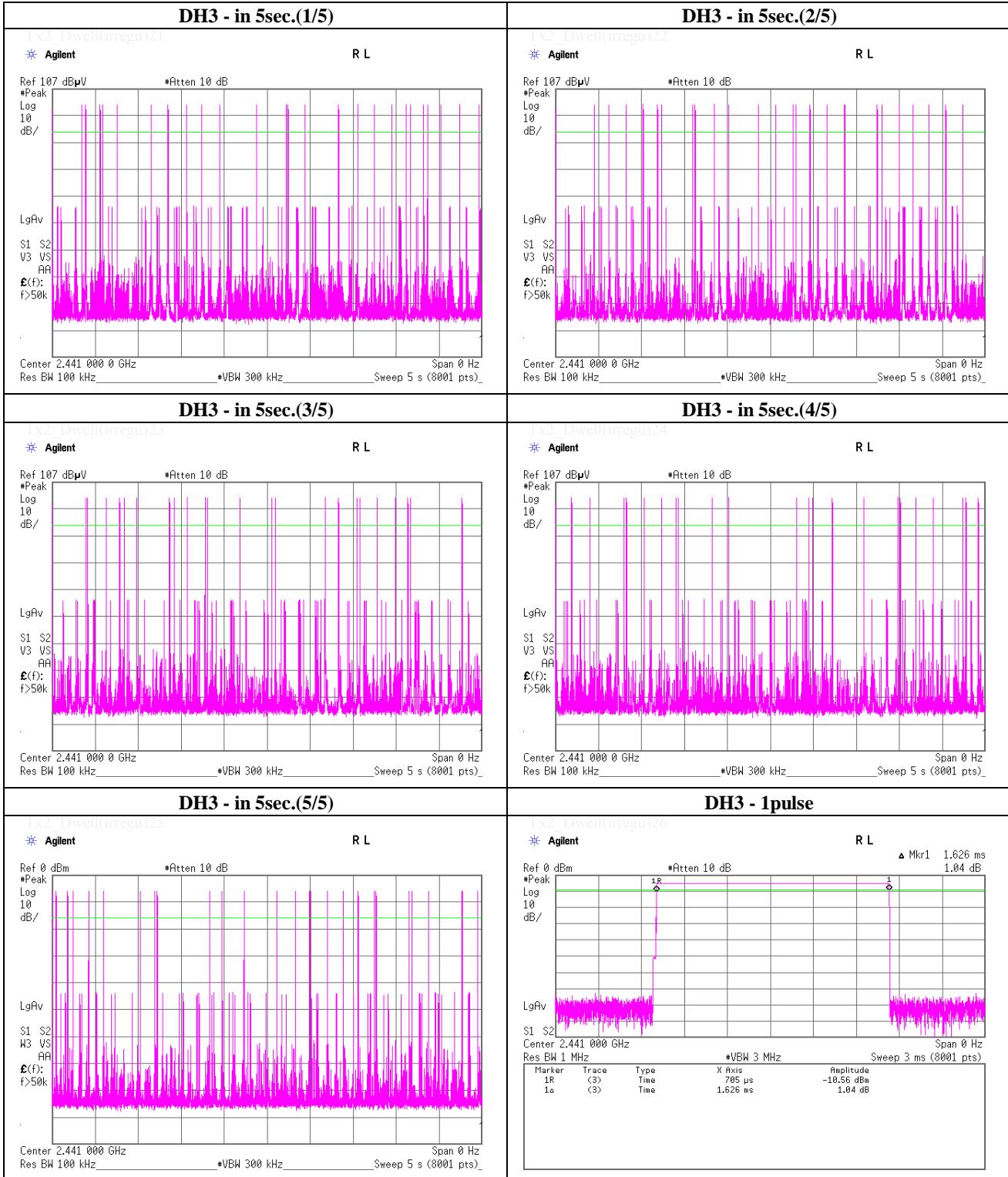
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Telephone : +81 463 50 6400

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Dwell time

Tx, Bluetooth, BDR, 1100



UL Japan, Inc.

Shonan EMC Lab.

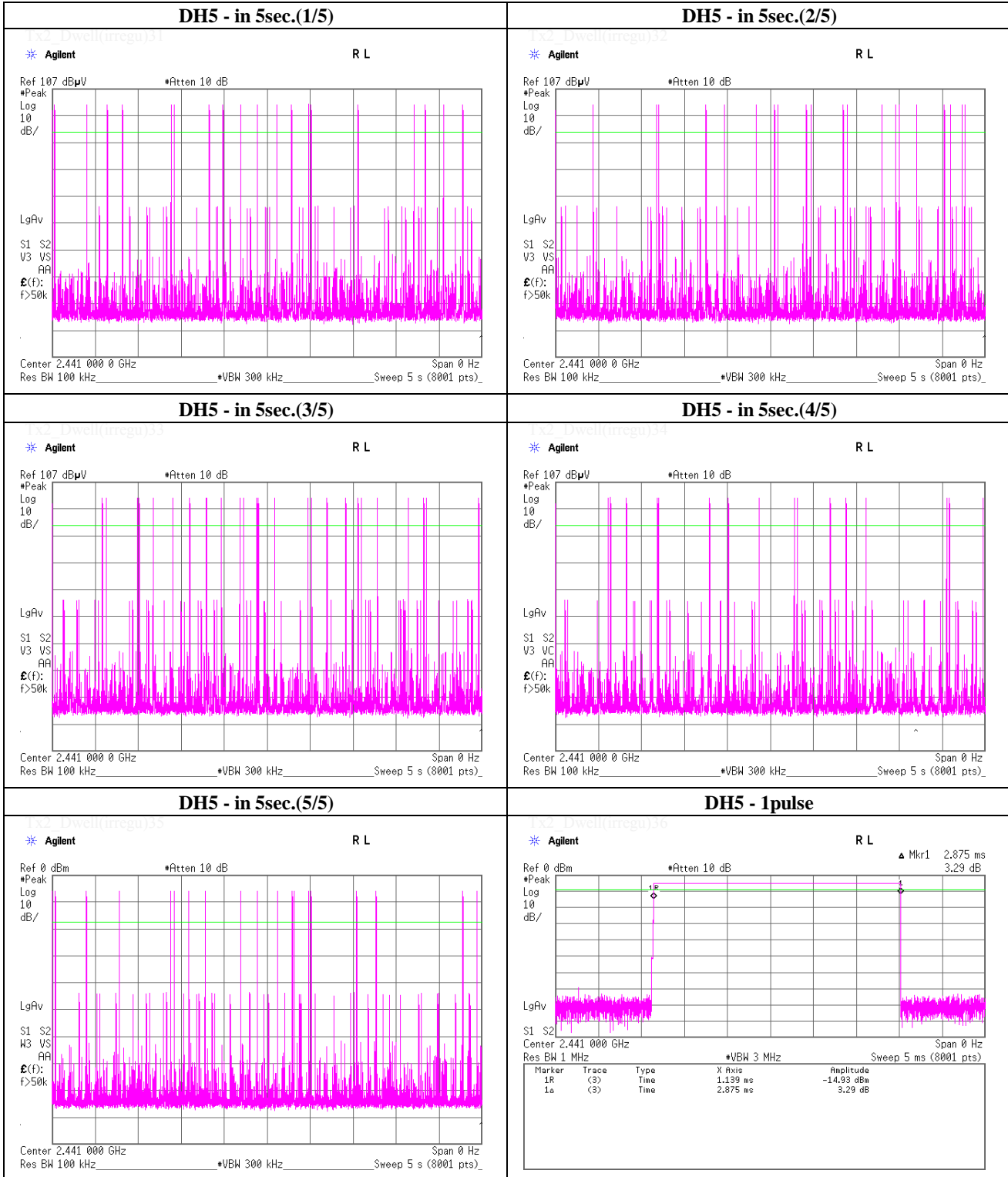
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Dwell time

Tx, Bluetooth, BDR, 1100



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date November 12, 2012
Temperature / Humidity 25 deg.C , 51 %RH
Engineer Hikaru Shirasawa
Mode Tx, Bluetooth, EDR, 1100

| 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 | 47.6 / 5.0 sec. x 31.6 sec. = 301 times | 0.378 | 114 | 400 |
| 3-DH3 | 24.8 / 5.0 sec. x 31.6 sec. = 157 times | 1.629 | 256 | 400 |
| 3-DH5 | 20.0 / 5.0 sec. x 31.6 sec. = 127 times | 2.881 | 366 | 400 |

Sample Calculation

Result = Number of transmission x Length of transmission time

*Average data of 5 tests.(except Inquiry)

| Mode | Sampling [times] | | | | | Average [times] |
|-------|------------------|----|----|----|----|--------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| 3-DH1 | 47 | 50 | 45 | 48 | 48 | 47.6 |
| 3-DH3 | 26 | 21 | 24 | 22 | 31 | 24.8 |
| 3-DH5 | 23 | 17 | 22 | 23 | 15 | 20.0 |

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 (3-DH1, 3-DH3 or 3-DH5). This is confirmed in the test report for $N=79$.

Tx2_DwellInquiry1

Tx2_DwellInquiry2

UL Japan, Inc.

Shonan EMC Lab.

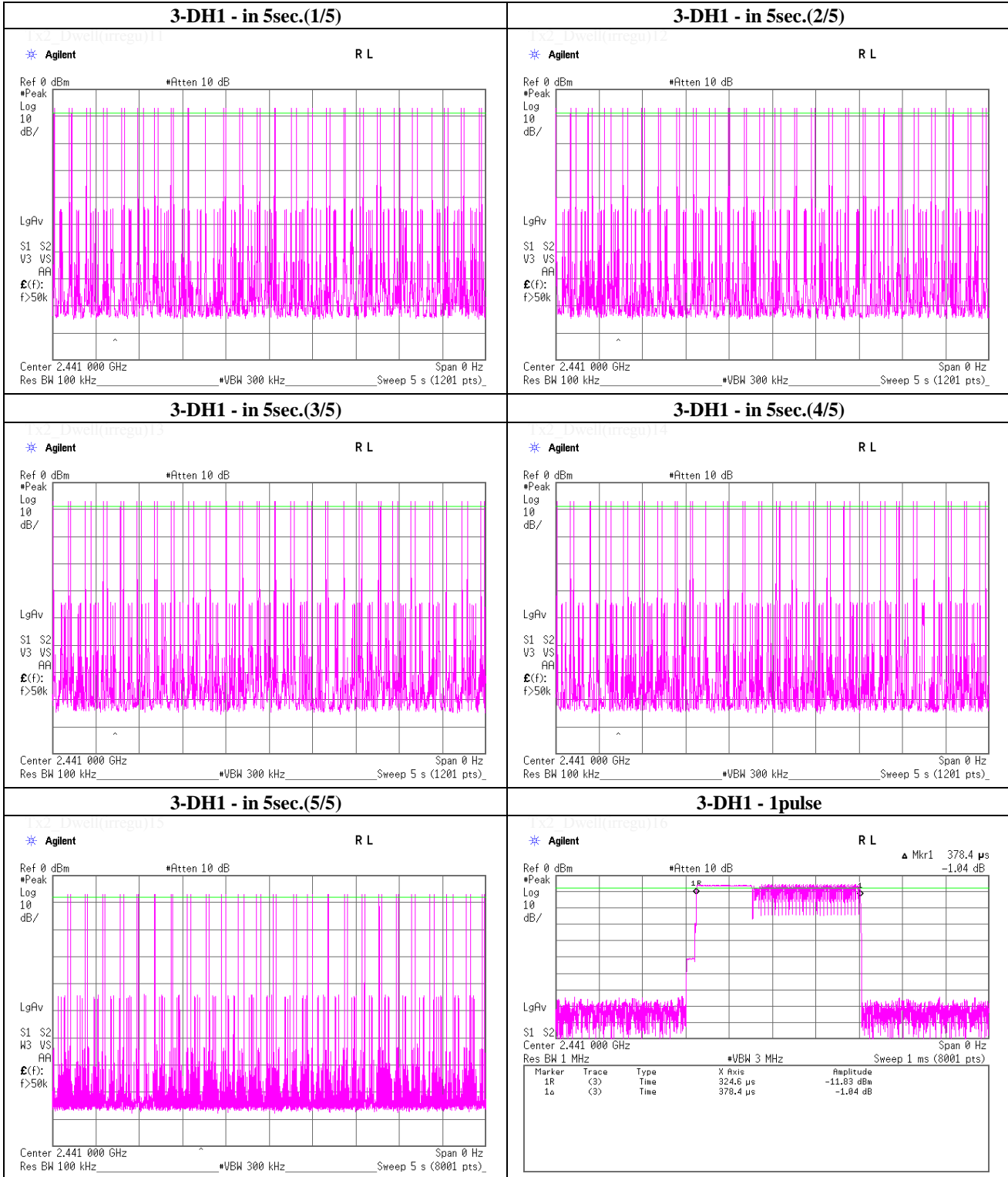
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Dwell time

Tx, Bluetooth, EDR, 1100



UL Japan, Inc.

Shonan EMC Lab.

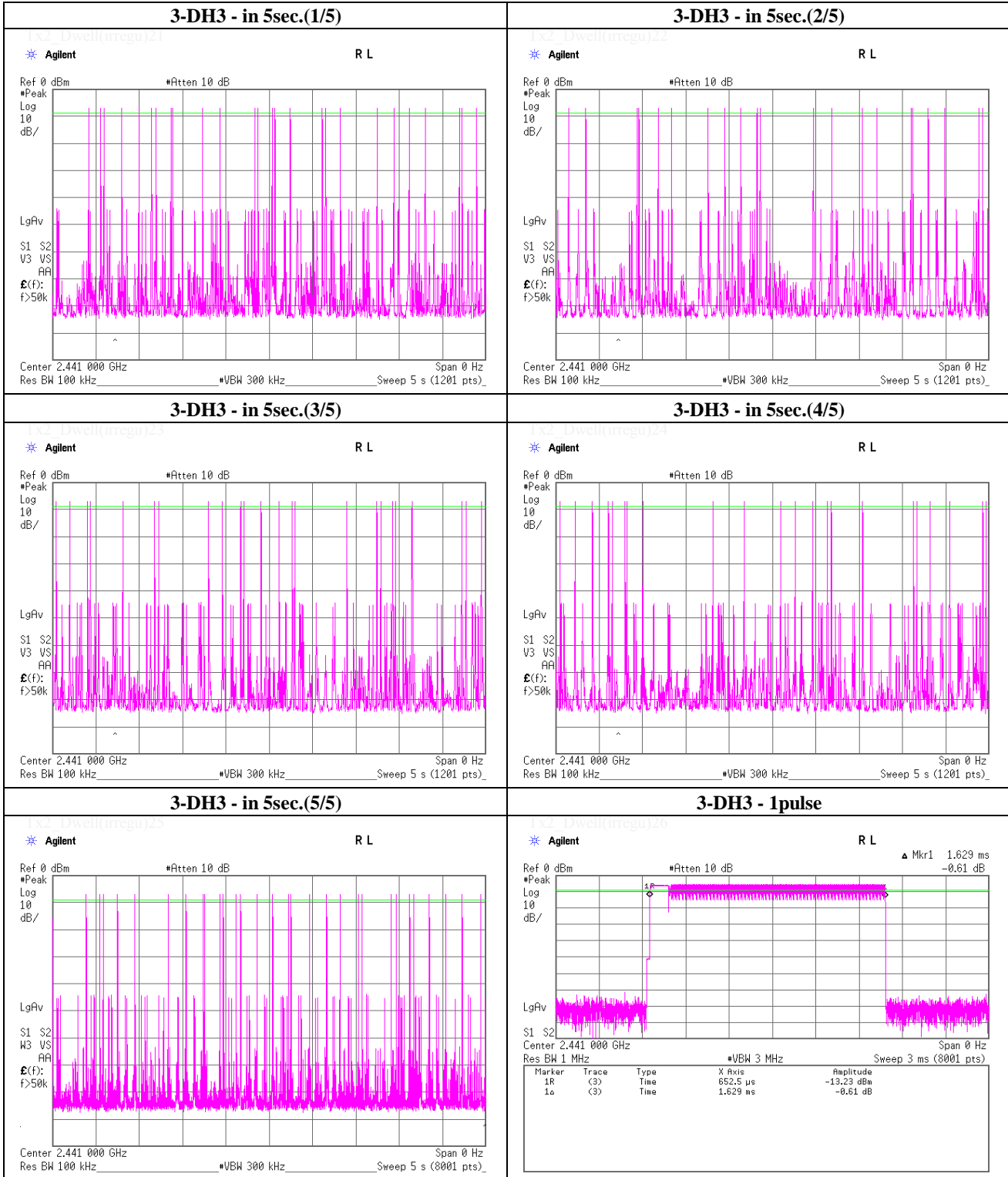
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Dwell time

Tx, Bluetooth, EDR, 1100



UL Japan, Inc.

Shonan EMC Lab.

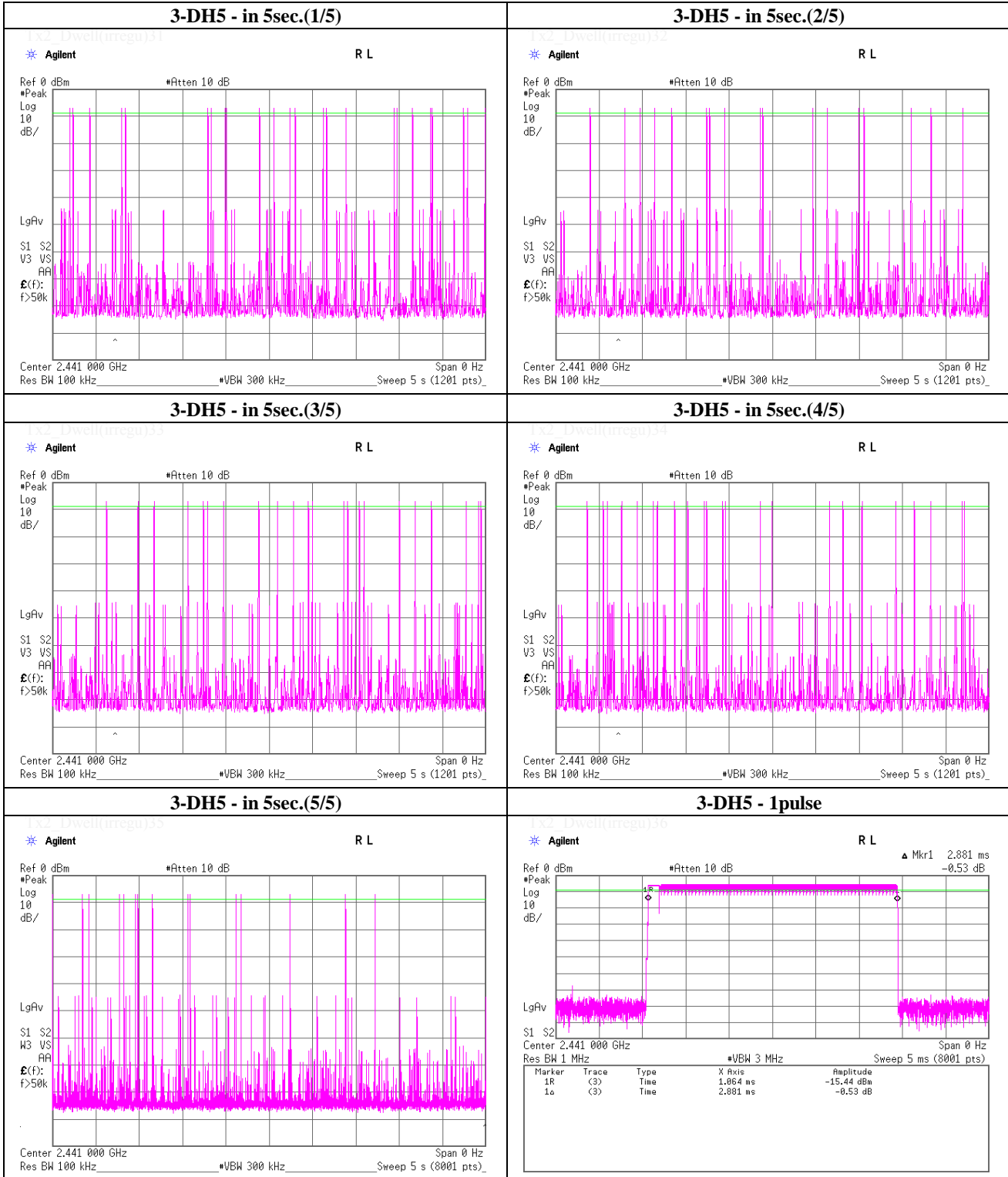
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Dwell time

Tx, Bluetooth, EDR, 1100



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Maximum Peak Conducted Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date November 12, 2012
Temperature / Humidity 25 deg.C , 51 %RH
Engineer Hikaru Shirasawa
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 | -5.16 | 1.31 | 10.00 | 6.15 | 4.12 | 20.97 | 125 | 14.82 |
| DH5 | 2441.0 | -4.69 | 1.32 | 10.00 | 6.63 | 4.60 | 20.97 | 125 | 14.34 |
| DH5 | 2480.0 | -4.43 | 1.33 | 10.00 | 6.90 | 4.90 | 20.97 | 125 | 14.07 |
| 2-DH5 | 2402.0 | -5.76 | 1.31 | 10.00 | 5.55 | 3.59 | 20.97 | 125 | 15.42 |
| 2-DH5 | 2441.0 | -5.27 | 1.32 | 10.00 | 6.05 | 4.03 | 20.97 | 125 | 14.92 |
| 2-DH5 | 2480.0 | -5.00 | 1.33 | 10.00 | 6.33 | 4.30 | 20.97 | 125 | 14.64 |
| 3-DH5 | 2402.0 | -5.19 | 1.31 | 10.00 | 6.12 | 4.09 | 20.97 | 125 | 14.85 |
| 3-DH5 | 2441.0 | -4.72 | 1.32 | 10.00 | 6.60 | 4.57 | 20.97 | 125 | 14.37 |
| 3-DH5 | 2480.0 | -4.45 | 1.33 | 10.00 | 6.88 | 4.88 | 20.97 | 125 | 14.09 |

Sample Calculation:

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

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Revised date : January 22, 2015

Radiated Emission

Test place : UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date : November 12, 2012 November 13, 2012
 Temperature / Humidity : 26deg.C, 37%RH 26deg.C, 33%RH
 Engineer : Kenichi Adachi Kenichi Adachi
 Mode : DH5, Tx 2402MHz

(* 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. | 2390.000 | PK | 45.9 | 27.4 | 14.2 | 41.4 | 46.1 | 73.9 | 27.8 | 100 | 51 | noise floor level |
| Hori. | 4804.000 | PK | 46.8 | 31.1 | 6.8 | 41.2 | 43.5 | 73.9 | 30.4 | 100 | 0 | noise floor level |
| Hori. | 7206.000 | PK | 46.9 | 36.6 | 8.3 | 41.4 | 50.4 | 73.9 | 23.5 | 122 | 359 | noise floor level |
| Hori. | 9608.000 | PK | 45.8 | 38.5 | 9.4 | 38.9 | 54.8 | 73.9 | 19.1 | 100 | 0 | noise floor level |
| Hori. | 12010.000 | PK | 44.3 | 39.4 | 10.7 | 39.4 | 55.0 | 73.9 | 18.9 | 100 | 0 | noise floor level |
| Hori. | 24020.000 | PK | 45.2 | 40.9 | -1.4 | 46.9 | 37.8 | 73.9 | 36.1 | 100 | 0 | noise floor level |
| Hori. | 2390.000 | AV | 33.7 | 27.4 | 14.2 | 41.4 | 33.9 | 53.9 | 20.0 | 100 | 51 | noise floor level |
| Hori. | 4804.000 | AV | 34.0 | 31.1 | 6.8 | 41.2 | 30.7 | 53.9 | 23.2 | 100 | 0 | noise floor level |
| Hori. | 7206.000 | AV | 34.4 | 36.6 | 8.3 | 41.4 | 37.9 | 53.9 | 16.0 | 122 | 359 | noise floor level |
| Hori. | 9608.000 | AV | 32.8 | 38.5 | 9.4 | 38.9 | 41.8 | 53.9 | 12.1 | 100 | 0 | noise floor level |
| Hori. | 12010.000 | AV | 32.1 | 39.4 | 10.7 | 39.4 | 42.8 | 53.9 | 11.1 | 100 | 0 | noise floor level |
| Hori. | 24020.000 | AV | 32.8 | 40.9 | -1.4 | 46.9 | 25.4 | 53.9 | 28.5 | 100 | 0 | noise floor level |
| Vert. | 2390.000 | PK | 45.8 | 27.4 | 14.2 | 41.4 | 46.0 | 73.9 | 27.9 | 100 | 41 | noise floor level |
| Vert. | 4804.000 | PK | 46.9 | 31.1 | 6.8 | 41.2 | 43.6 | 73.9 | 30.3 | 100 | 0 | noise floor level |
| Vert. | 7206.000 | PK | 46.8 | 36.6 | 8.3 | 41.4 | 50.3 | 73.9 | 23.6 | 126 | 24 | noise floor level |
| Vert. | 9608.000 | PK | 45.9 | 38.5 | 9.4 | 38.9 | 54.9 | 73.9 | 19.0 | 100 | 0 | noise floor level |
| Vert. | 12010.000 | PK | 44.4 | 39.4 | 10.7 | 39.4 | 55.1 | 73.9 | 18.8 | 100 | 0 | noise floor level |
| Vert. | 24020.000 | PK | 45.3 | 40.9 | -1.4 | 46.9 | 37.9 | 73.9 | 36.0 | 100 | 0 | noise floor level |
| Vert. | 2390.000 | AV | 33.6 | 27.4 | 14.2 | 41.4 | 33.8 | 53.9 | 20.1 | 100 | 41 | noise floor level |
| Vert. | 4804.000 | AV | 34.0 | 31.1 | 6.8 | 41.2 | 30.7 | 53.9 | 23.2 | 100 | 0 | noise floor level |
| Vert. | 7206.000 | AV | 34.6 | 36.6 | 8.3 | 41.4 | 38.1 | 53.9 | 15.8 | 126 | 24 | noise floor level |
| Vert. | 9608.000 | AV | 32.8 | 38.5 | 9.4 | 38.9 | 41.8 | 53.9 | 12.1 | 100 | 0 | noise floor level |
| Vert. | 12010.000 | AV | 32.2 | 39.4 | 10.7 | 39.4 | 42.9 | 53.9 | 11.0 | 100 | 0 | noise floor level |
| Vert. | 24020.000 | AV | 32.9 | 40.9 | -1.4 | 46.9 | 25.5 | 53.9 | 28.4 | 100 | 0 | noise floor level |

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]

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-------------------|-----------|-----------|-----------------|----------------|-------------|-------------|-------------|---------|
| Hori. | 2402.000 | PK | 89.0 | 27.4 | 14.2 | 41.4 | 89.2 | - | - | 100 | 51 | carrier |
| Hori. | 312.016 | PK | 73.6 | 14.2 | 8.6 | 32.0 | 64.4 | 69.2 | 4.8 | 100 | 96 | *1) |
| Hori. | 2400.000 | PK | 39.3 | 27.4 | 14.2 | 41.4 | 39.5 | 69.2 | 29.7 | 100 | 51 | |
| Vert. | 2402.000 | PK | 88.6 | 27.4 | 14.2 | 41.4 | 88.8 | - | - | 100 | 41 | carrier |
| Vert. | 312.016 | PK | 68.1 | 14.2 | 8.6 | 32.0 | 58.9 | 68.8 | 9.9 | 168 | 222 | *1) |
| Vert. | 2400.000 | PK | 39.2 | 27.4 | 14.2 | 41.4 | 39.4 | 68.8 | 29.4 | 100 | 41 | |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

*1) The noise of this frequency is a noise that originates in the radio circuit.

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Shonan EMC Lab.

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Revised date : January 22, 2015

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date November 12, 2012 November 13, 2012
 Temperature / Humidity 26deg.C, 37%RH 26deg.C, 33%RH
 Engineer Kenichi Adachi Kenichi Adachi
 Mode DH5, Tx 2441MHz

(* 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. | 4882.000 | PK | 46.9 | 31.3 | 6.9 | 41.1 | 44.0 | 73.9 | 29.9 | 100 | 0 | noise floor level |
| Hori. | 7323.000 | PK | 46.9 | 36.6 | 8.6 | 41.4 | 50.7 | 73.9 | 23.2 | 122 | 356 | noise floor level |
| Hori. | 12205.000 | PK | 44.6 | 39.5 | 10.8 | 39.3 | 55.6 | 73.9 | 18.3 | 100 | 0 | noise floor level |
| Hori. | 24410.000 | PK | 45.1 | 40.7 | -1.5 | 47.1 | 37.2 | 73.9 | 36.7 | 100 | 0 | noise floor level |
| Hori. | 4882.000 | AV | 34.0 | 31.3 | 6.9 | 41.1 | 31.1 | 53.9 | 22.8 | 100 | 0 | noise floor level |
| Hori. | 7323.000 | AV | 34.5 | 36.6 | 8.6 | 41.4 | 38.3 | 53.9 | 15.6 | 122 | 356 | noise floor level |
| Hori. | 12205.000 | AV | 32.3 | 39.5 | 10.8 | 39.3 | 43.3 | 53.9 | 10.6 | 100 | 0 | noise floor level |
| Hori. | 24410.000 | AV | 32.7 | 40.7 | -1.5 | 47.1 | 24.8 | 53.9 | 29.1 | 100 | 0 | noise floor level |
| Vert. | 4882.000 | PK | 46.8 | 31.3 | 6.9 | 41.1 | 43.9 | 73.9 | 30.0 | 100 | 0 | noise floor level |
| Vert. | 7323.000 | PK | 47.0 | 36.6 | 8.6 | 41.4 | 50.8 | 73.9 | 23.1 | 148 | 12 | noise floor level |
| Vert. | 12205.000 | PK | 44.7 | 39.5 | 10.8 | 39.3 | 55.7 | 73.9 | 18.2 | 100 | 0 | noise floor level |
| Vert. | 24410.000 | PK | 45.0 | 40.7 | -1.5 | 47.1 | 37.1 | 73.9 | 36.8 | 100 | 0 | noise floor level |
| Vert. | 4882.000 | AV | 33.9 | 31.3 | 6.9 | 41.1 | 31.0 | 53.9 | 22.9 | 100 | 0 | noise floor level |
| Vert. | 7323.000 | AV | 34.8 | 36.6 | 8.6 | 41.4 | 38.6 | 53.9 | 15.3 | 148 | 12 | noise floor level |
| Vert. | 12205.000 | AV | 32.4 | 39.5 | 10.8 | 39.3 | 43.4 | 53.9 | 10.5 | 100 | 0 | noise floor level |
| Vert. | 24410.000 | AV | 32.6 | 40.7 | -1.5 | 47.1 | 24.7 | 53.9 | 29.2 | 100 | 0 | noise floor level |

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]

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-------------------|-----------|-----------|-----------------|----------------|-------------|-------------|-------------|---------|
| Hori. | 2441.000 | PK | 87.1 | 27.5 | 14.2 | 41.4 | 87.4 | - | - | 148 | 43 | carrier |
| Hori. | 312.018 | PK | 73.5 | 14.2 | 8.6 | 32.0 | 64.3 | 67.4 | 3.1 | 100 | 92 | *1) |
| Vert. | 2441.000 | PK | 88.3 | 27.5 | 14.2 | 41.4 | 88.6 | - | - | 108 | 34 | carrier |
| Vert. | 312.018 | PK | 68.1 | 14.2 | 8.6 | 32.0 | 58.9 | 68.6 | 9.7 | 170 | 225 | *1) |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

*1) The noise of this frequency is a noise that originates in the radio circuit.

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Revised date : January 22, 2015

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date November 12, 2012 November 13, 2012
 Temperature / Humidity 26deg.C, 37%RH 26deg.C, 33%RH
 Engineer Kenichi Adachi Kenichi Adachi
 Mode DH5, Tx 2480MHz

(* 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. | 2483.500 | PK | 46.0 | 27.5 | 14.3 | 41.4 | 46.4 | 73.9 | 27.5 | 122 | 30 | noise floor level |
| Hori. | 4960.000 | PK | 47.1 | 31.6 | 6.9 | 41.0 | 44.6 | 73.9 | 29.3 | 100 | 0 | noise floor level |
| Hori. | 7440.000 | PK | 47.8 | 36.7 | 8.8 | 41.5 | 51.8 | 73.9 | 22.1 | 125 | 359 | noise floor level |
| Hori. | 12400.000 | PK | 45.8 | 39.5 | 10.8 | 39.3 | 56.8 | 73.9 | 17.1 | 100 | 0 | noise floor level |
| Hori. | 24800.000 | PK | 45.5 | 40.5 | -1.5 | 47.1 | 37.4 | 73.9 | 36.5 | 100 | 0 | noise floor level |
| Hori. | 2483.500 | AV | 34.0 | 27.5 | 14.3 | 41.4 | 34.4 | 53.9 | 19.5 | 122 | 30 | noise floor level |
| Hori. | 4960.000 | AV | 33.9 | 31.6 | 6.9 | 41.0 | 31.4 | 53.9 | 22.5 | 100 | 0 | noise floor level |
| Hori. | 7440.000 | AV | 35.2 | 36.7 | 8.8 | 41.5 | 39.2 | 53.9 | 14.7 | 125 | 359 | noise floor level |
| Hori. | 12400.000 | AV | 33.2 | 39.5 | 10.8 | 39.3 | 44.2 | 53.9 | 9.7 | 100 | 0 | noise floor level |
| Hori. | 24800.000 | AV | 32.8 | 40.5 | -1.5 | 47.1 | 24.7 | 53.9 | 29.2 | 100 | 0 | noise floor level |
| Vert. | 2483.500 | PK | 45.9 | 27.5 | 14.3 | 41.4 | 46.3 | 73.9 | 27.6 | 100 | 33 | noise floor level |
| Vert. | 4960.000 | PK | 47.0 | 31.6 | 6.9 | 41.0 | 44.5 | 73.9 | 29.4 | 100 | 0 | noise floor level |
| Vert. | 7440.000 | PK | 47.9 | 36.7 | 8.8 | 41.5 | 51.9 | 73.9 | 22.0 | 138 | 15 | noise floor level |
| Vert. | 12400.000 | PK | 45.7 | 39.5 | 10.8 | 39.3 | 56.7 | 73.9 | 17.2 | 100 | 0 | noise floor level |
| Vert. | 24800.000 | PK | 45.4 | 40.5 | -1.5 | 47.1 | 37.3 | 73.9 | 36.6 | 100 | 0 | noise floor level |
| Vert. | 2483.500 | AV | 34.1 | 27.5 | 14.3 | 41.4 | 34.5 | 53.9 | 19.4 | 100 | 33 | noise floor level |
| Vert. | 4960.000 | AV | 34.0 | 31.6 | 6.9 | 41.0 | 31.5 | 53.9 | 22.4 | 100 | 0 | noise floor level |
| Vert. | 7440.000 | AV | 35.6 | 36.7 | 8.8 | 41.5 | 39.6 | 53.9 | 14.3 | 138 | 15 | noise floor level |
| Vert. | 12400.000 | AV | 33.1 | 39.5 | 10.8 | 39.3 | 44.1 | 53.9 | 9.8 | 100 | 0 | noise floor level |
| Vert. | 24800.000 | AV | 32.7 | 40.5 | -1.5 | 47.1 | 24.6 | 53.9 | 29.3 | 100 | 0 | noise floor level |

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]

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-------------------|-----------|-----------|-----------------|----------------|-------------|-------------|-------------|---------|
| Hori. | 2480.000 | PK | 87.6 | 27.5 | 14.3 | 41.4 | 88.0 | - | - | 122 | 30 | carrier |
| Hori. | 312.015 | PK | 73.5 | 14.2 | 8.6 | 32.0 | 64.3 | 68.0 | 3.7 | 100 | 95 | *1) |
| Vert. | 2480.000 | PK | 88.6 | 27.5 | 14.3 | 41.4 | 89.0 | - | - | 100 | 33 | carrier |
| Vert. | 312.015 | PK | 68.0 | 14.2 | 8.6 | 32.0 | 58.8 | 69.0 | 10.2 | 172 | 223 | *1) |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

*1) The noise of this frequency is a noise that originates in the radio circuit.

UL Japan, Inc.
Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Revised date : January 22, 2015

Radiated Emission

Test place : UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date : November 12, 2012 November 13, 2012
Temperature / Humidity : 26deg.C, 37%RH 26deg.C, 33%RH
Engineer : Kenichi Adachi Kenichi Adachi
Mode : 3-DH5, Tx 2402MHz

(* 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. | 2390.000 | PK | 46.0 | 27.4 | 14.2 | 41.4 | 46.2 | 73.9 | 27.7 | 105 | 49 | noise floor level |
| Hori. | 4804.000 | PK | 47.1 | 31.1 | 6.8 | 41.2 | 43.8 | 73.9 | 30.1 | 100 | 0 | noise floor level |
| Hori. | 7206.000 | PK | 46.9 | 36.6 | 8.3 | 41.4 | 50.4 | 73.9 | 23.5 | 142 | 253 | noise floor level |
| Hori. | 9608.000 | PK | 46.0 | 38.5 | 9.4 | 38.9 | 55.0 | 73.9 | 18.9 | 100 | 0 | noise floor level |
| Hori. | 12010.000 | PK | 44.5 | 39.4 | 10.7 | 39.4 | 55.2 | 73.9 | 18.7 | 100 | 0 | noise floor level |
| Hori. | 2390.000 | AV | 33.6 | 27.4 | 14.2 | 41.4 | 33.8 | 53.9 | 20.1 | 105 | 49 | noise floor level |
| Hori. | 4804.000 | AV | 34.1 | 31.1 | 6.8 | 41.2 | 30.8 | 53.9 | 23.1 | 100 | 0 | noise floor level |
| Hori. | 7206.000 | AV | 34.4 | 36.6 | 8.3 | 41.4 | 37.9 | 53.9 | 16.0 | 142 | 253 | noise floor level |
| Hori. | 9608.000 | AV | 32.9 | 38.5 | 9.4 | 38.9 | 41.9 | 53.9 | 12.0 | 100 | 0 | noise floor level |
| Hori. | 12010.000 | AV | 32.2 | 39.4 | 10.7 | 39.4 | 42.9 | 53.9 | 11.0 | 100 | 0 | noise floor level |
| Vert. | 2390.000 | PK | 45.9 | 27.4 | 14.2 | 41.4 | 46.1 | 73.9 | 27.8 | 109 | 36 | noise floor level |
| Vert. | 4804.000 | PK | 47.0 | 31.1 | 6.8 | 41.2 | 43.7 | 73.9 | 30.2 | 100 | 0 | noise floor level |
| Vert. | 7206.000 | PK | 46.9 | 36.6 | 8.3 | 41.4 | 50.4 | 73.9 | 23.5 | 138 | 32 | noise floor level |
| Vert. | 9608.000 | PK | 45.8 | 38.5 | 9.4 | 38.9 | 54.8 | 73.9 | 19.1 | 100 | 0 | noise floor level |
| Vert. | 12010.000 | PK | 44.4 | 39.4 | 10.7 | 39.4 | 55.1 | 73.9 | 18.8 | 100 | 0 | noise floor level |
| Vert. | 2390.000 | AV | 33.7 | 27.4 | 14.2 | 41.4 | 33.9 | 53.9 | 20.0 | 109 | 36 | noise floor level |
| Vert. | 4804.000 | AV | 34.0 | 31.1 | 6.8 | 41.2 | 30.7 | 53.9 | 23.2 | 100 | 0 | noise floor level |
| Vert. | 7206.000 | AV | 34.7 | 36.6 | 8.3 | 41.4 | 38.2 | 53.9 | 15.7 | 138 | 32 | noise floor level |
| Vert. | 9608.000 | AV | 32.8 | 38.5 | 9.4 | 38.9 | 41.8 | 53.9 | 12.1 | 100 | 0 | noise floor level |
| Vert. | 12010.000 | AV | 32.1 | 39.4 | 10.7 | 39.4 | 42.8 | 53.9 | 11.1 | 100 | 0 | noise floor level |

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]

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] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|-------------|-------------|---------|
| Hori. | 2402.000 | PK | 86.8 | 27.4 | 14.2 | 41.4 | 87.0 | - | - | 105 | 48 | carrier |
| Hori. | 71.998 | PK | 58.0 | 6.5 | 7.0 | 32.2 | 39.3 | 67.0 | 27.7 | 155 | 283 | *2) |
| Hori. | 216.005 | PK | 69.2 | 16.6 | 8.0 | 32.0 | 61.8 | 67.0 | 5.2 | 156 | 68 | *2) |
| Hori. | 288.004 | PK | 55.7 | 19.0 | 8.5 | 32.0 | 51.2 | 67.0 | 15.8 | 118 | 40 | *2) |
| Hori. | 312.017 | PK | 73.5 | 14.2 | 8.6 | 32.0 | 64.3 | 67.0 | 2.7 | 100 | 94 | *1) |
| Hori. | 336.019 | PK | 57.2 | 14.8 | 8.7 | 32.0 | 48.7 | 67.0 | 18.3 | 100 | 98 | *2) |
| Hori. | 360.025 | PK | 64.9 | 15.3 | 8.8 | 32.0 | 57.0 | 67.0 | 10.0 | 100 | 107 | *2) |
| Hori. | 696.044 | PK | 46.9 | 20.2 | 10.1 | 31.9 | 45.3 | 67.0 | 21.7 | 135 | 235 | *2) |
| Hori. | 744.046 | PK | 50.2 | 20.5 | 10.3 | 31.8 | 49.2 | 67.0 | 17.8 | 100 | 118 | *2) |
| Hori. | 840.052 | PK | 45.6 | 21.4 | 10.5 | 31.4 | 46.1 | 67.0 | 20.9 | 100 | 221 | *2) |
| Hori. | 888.055 | PK | 46.9 | 22.1 | 10.7 | 31.2 | 48.5 | 67.0 | 18.5 | 114 | 159 | *2) |
| Hori. | 912.057 | PK | 43.7 | 22.3 | 10.7 | 31.0 | 45.7 | 67.0 | 21.3 | 141 | 171 | *2) |
| Hori. | 936.058 | PK | 43.4 | 22.5 | 10.8 | 30.8 | 45.9 | 67.0 | 21.1 | 142 | 165 | *1) |
| Hori. | 2400.000 | PK | 38.7 | 27.4 | 14.2 | 41.4 | 38.9 | 67.0 | 28.1 | 105 | 48 | |
| Vert. | 2402.000 | PK | 87.4 | 27.4 | 14.2 | 41.4 | 87.6 | - | - | 109 | 36 | carrier |
| Vert. | 71.998 | PK | 58.6 | 6.5 | 7.0 | 32.2 | 39.9 | 67.6 | 27.7 | 100 | 272 | *2) |
| Vert. | 216.005 | PK | 65.1 | 16.6 | 8.0 | 32.0 | 57.7 | 67.6 | 9.9 | 100 | 253 | *2) |
| Vert. | 288.004 | PK | 52.3 | 19.0 | 8.5 | 32.0 | 47.8 | 67.6 | 19.8 | 100 | 224 | *2) |
| Vert. | 312.017 | PK | 68.2 | 14.2 | 8.6 | 32.0 | 59.0 | 67.6 | 8.6 | 173 | 220 | *1) |
| Vert. | 336.019 | PK | 53.2 | 14.8 | 8.7 | 32.0 | 44.7 | 67.6 | 22.9 | 130 | 218 | *2) |
| Vert. | 360.025 | PK | 62.9 | 15.3 | 8.8 | 32.0 | 55.0 | 67.6 | 12.6 | 139 | 227 | *2) |
| Vert. | 696.044 | PK | 46.7 | 20.2 | 10.1 | 31.9 | 45.1 | 67.6 | 22.5 | 100 | 265 | *2) |
| Vert. | 744.046 | PK | 43.8 | 20.5 | 10.3 | 31.8 | 42.8 | 67.6 | 24.8 | 100 | 244 | *2) |
| Vert. | 888.055 | PK | 41.6 | 22.1 | 10.7 | 31.2 | 43.2 | 67.6 | 24.4 | 154 | 230 | *2) |
| Vert. | 936.058 | PK | 42.3 | 22.5 | 10.8 | 30.8 | 44.8 | 67.6 | 22.8 | 100 | 13 | *1) |
| Vert. | 2400.000 | PK | 39.0 | 27.4 | 14.2 | 41.4 | 39.2 | 67.6 | 28.4 | 109 | 36 | |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

*1) The noise of this frequency is a noise that originates in the radio circuit.

*2) 20dBc limit was applied for the noise that originate in-vehicle equipment part and the noise that did not originate in the radio part, because EUT is in-vehicle equipment and it is an equipment that should not suit FCC15B.

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Revised date : January 22, 2015

Radiated Emission

Test place : UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date : November 12, 2012 November 13, 2012
 Temperature / Humidity : 26deg.C, 37%RH 26deg.C, 33%RH
 Engineer : Kenichi Adachi Kenichi Adachi
 Mode : 3-DH5, Tx 2441MHz

(* 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. | 4882.000 | PK | 47.1 | 31.3 | 6.9 | 41.1 | 44.2 | 73.9 | 29.7 | 100 | 0 | noise floor level |
| Hori. | 7323.000 | PK | 47.8 | 36.6 | 8.6 | 41.4 | 51.6 | 73.9 | 22.3 | 117 | 12 | noise floor level |
| Hori. | 12205.000 | PK | 44.7 | 39.5 | 10.8 | 39.3 | 55.7 | 73.9 | 18.2 | 100 | 0 | noise floor level |
| Hori. | 24410.000 | PK | 45.0 | 40.7 | -1.5 | 47.1 | 37.1 | 73.9 | 36.8 | 100 | 0 | noise floor level |
| Hori. | 4882.000 | AV | 34.0 | 31.3 | 6.9 | 41.1 | 31.1 | 53.9 | 22.8 | 100 | 0 | noise floor level |
| Hori. | 7323.000 | AV | 35.6 | 36.6 | 8.6 | 41.4 | 39.4 | 53.9 | 14.5 | 117 | 12 | noise floor level |
| Hori. | 12205.000 | AV | 32.4 | 39.5 | 10.8 | 39.3 | 43.4 | 53.9 | 10.5 | 100 | 0 | noise floor level |
| Hori. | 24410.000 | AV | 32.6 | 40.7 | -1.5 | 47.1 | 24.7 | 53.9 | 29.2 | 100 | 0 | noise floor level |
| Vert. | 4882.000 | PK | 46.9 | 31.3 | 6.9 | 41.1 | 44.0 | 73.9 | 29.9 | 100 | 0 | noise floor level |
| Vert. | 7323.000 | PK | 48.6 | 36.6 | 8.6 | 41.4 | 52.4 | 73.9 | 21.5 | 142 | 16 | noise floor level |
| Vert. | 12205.000 | PK | 44.6 | 39.5 | 10.8 | 39.3 | 55.6 | 73.9 | 18.3 | 100 | 0 | noise floor level |
| Vert. | 24410.000 | PK | 45.1 | 40.7 | -1.5 | 47.1 | 37.2 | 73.9 | 36.7 | 100 | 0 | noise floor level |
| Vert. | 4882.000 | AV | 34.0 | 31.3 | 6.9 | 41.1 | 31.1 | 53.9 | 22.8 | 100 | 0 | noise floor level |
| Vert. | 7323.000 | AV | 36.1 | 36.6 | 8.6 | 41.4 | 39.9 | 53.9 | 14.0 | 142 | 16 | noise floor level |
| Vert. | 12205.000 | AV | 32.3 | 39.5 | 10.8 | 39.3 | 43.3 | 53.9 | 10.6 | 100 | 0 | noise floor level |
| Vert. | 24410.000 | AV | 32.7 | 40.7 | -1.5 | 47.1 | 24.8 | 53.9 | 29.1 | 100 | 0 | noise floor level |

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]

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-------------------|-----------|-----------|-----------------|----------------|-------------|-------------|-------------|---------|
| Hori. | 2441.000 | PK | 86.0 | 27.5 | 14.2 | 41.4 | 86.3 | - | - | 154 | 41 | carrier |
| Hori. | 312.019 | PK | 73.4 | 14.2 | 8.6 | 32.0 | 64.2 | 66.3 | 2.1 | 100 | 95 | *1) |
| Vert. | 2441.000 | PK | 86.7 | 27.5 | 14.2 | 41.4 | 87.0 | - | - | 104 | 33 | carrier |
| Vert. | 312.019 | PK | 68.2 | 14.2 | 8.6 | 32.0 | 59.0 | 67.0 | 8.0 | 169 | 227 | *1) |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

*1) The noise of this frequency is a noise that originates in the radio circuit.

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Revised date : January 22, 2015

Radiated Emission

Test place : UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date : November 12, 2012 November 13, 2012
 Temperature / Humidity : 26deg.C, 37%RH 26deg.C, 33%RH
 Engineer : Kenichi Adachi Kenichi Adachi
 Mode : 3-DH5, Tx 2480MHz

(* 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. | 2483.500 | PK | 46.0 | 27.5 | 14.3 | 41.4 | 46.4 | 73.9 | 27.5 | 120 | 30 | noise floor level |
| Hori. | 4960.000 | PK | 47.0 | 31.6 | 6.9 | 41.0 | 44.5 | 73.9 | 29.4 | 100 | 0 | noise floor level |
| Hori. | 7440.000 | PK | 49.0 | 36.7 | 8.8 | 41.5 | 53.0 | 73.9 | 20.9 | 124 | 257 | noise floor level |
| Hori. | 12400.000 | PK | 45.7 | 39.5 | 10.8 | 39.3 | 56.7 | 73.9 | 17.2 | 100 | 0 | noise floor level |
| Hori. | 24800.000 | PK | 45.4 | 40.5 | -1.5 | 47.1 | 37.3 | 73.9 | 36.6 | 100 | 0 | noise floor level |
| Hori. | 2483.500 | AV | 34.0 | 27.5 | 14.3 | 41.4 | 34.4 | 53.9 | 19.5 | 120 | 30 | noise floor level |
| Hori. | 4960.000 | AV | 34.0 | 31.6 | 6.9 | 41.0 | 31.5 | 53.9 | 22.4 | 100 | 0 | noise floor level |
| Hori. | 7440.000 | AV | 35.9 | 36.7 | 8.8 | 41.5 | 39.9 | 53.9 | 14.0 | 124 | 257 | noise floor level |
| Hori. | 12400.000 | AV | 33.1 | 39.5 | 10.8 | 39.3 | 44.1 | 53.9 | 9.8 | 100 | 0 | noise floor level |
| Hori. | 24800.000 | AV | 32.7 | 40.5 | -1.5 | 47.1 | 24.6 | 53.9 | 29.3 | 100 | 0 | noise floor level |
| Vert. | 2483.500 | PK | 46.1 | 27.5 | 14.3 | 41.4 | 46.5 | 73.9 | 27.4 | 100 | 34 | noise floor level |
| Vert. | 4960.000 | PK | 46.9 | 31.6 | 6.9 | 41.0 | 44.4 | 73.9 | 29.5 | 100 | 0 | noise floor level |
| Vert. | 7440.000 | PK | 48.9 | 36.7 | 8.8 | 41.5 | 52.9 | 73.9 | 21.0 | 100 | 259 | noise floor level |
| Vert. | 12400.000 | PK | 45.8 | 39.5 | 10.8 | 39.3 | 56.8 | 73.9 | 17.1 | 100 | 0 | noise floor level |
| Vert. | 24800.000 | PK | 45.5 | 40.5 | -1.5 | 47.1 | 37.4 | 73.9 | 36.5 | 100 | 0 | noise floor level |
| Vert. | 2483.500 | AV | 34.0 | 27.5 | 14.3 | 41.4 | 34.4 | 53.9 | 19.5 | 100 | 34 | noise floor level |
| Vert. | 4960.000 | AV | 34.0 | 31.6 | 6.9 | 41.0 | 31.5 | 53.9 | 22.4 | 100 | 0 | noise floor level |
| Vert. | 7440.000 | AV | 36.7 | 36.7 | 8.8 | 41.5 | 40.7 | 53.9 | 13.2 | 100 | 259 | noise floor level |
| Vert. | 12400.000 | AV | 33.2 | 39.5 | 10.8 | 39.3 | 44.2 | 53.9 | 9.7 | 100 | 0 | noise floor level |
| Vert. | 24800.000 | AV | 32.7 | 40.5 | -1.5 | 47.1 | 24.6 | 53.9 | 29.3 | 100 | 0 | noise floor level |

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]

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark |
|----------|-----------------|----------|----------------|-------------------|-----------|-----------|-----------------|----------------|-------------|-------------|-------------|---------|
| Hori. | 2480.000 | PK | 86.1 | 27.5 | 14.3 | 41.4 | 86.5 | - | - | 120 | 30 | carrier |
| Hori. | 312.017 | PK | 73.4 | 14.2 | 8.6 | 32.0 | 64.2 | 66.5 | 2.3 | 100 | 93 | *1) |
| Vert. | 2480.000 | PK | 87.5 | 27.5 | 14.3 | 41.4 | 87.9 | - | - | 100 | 34 | carrier |
| Vert. | 312.017 | PK | 67.9 | 14.2 | 8.6 | 32.0 | 58.7 | 67.9 | 9.2 | 166 | 224 | *1) |

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

*1) The noise of this frequency is a noise that originates in the radio circuit.

UL Japan, Inc.

Shonan EMC Lab.

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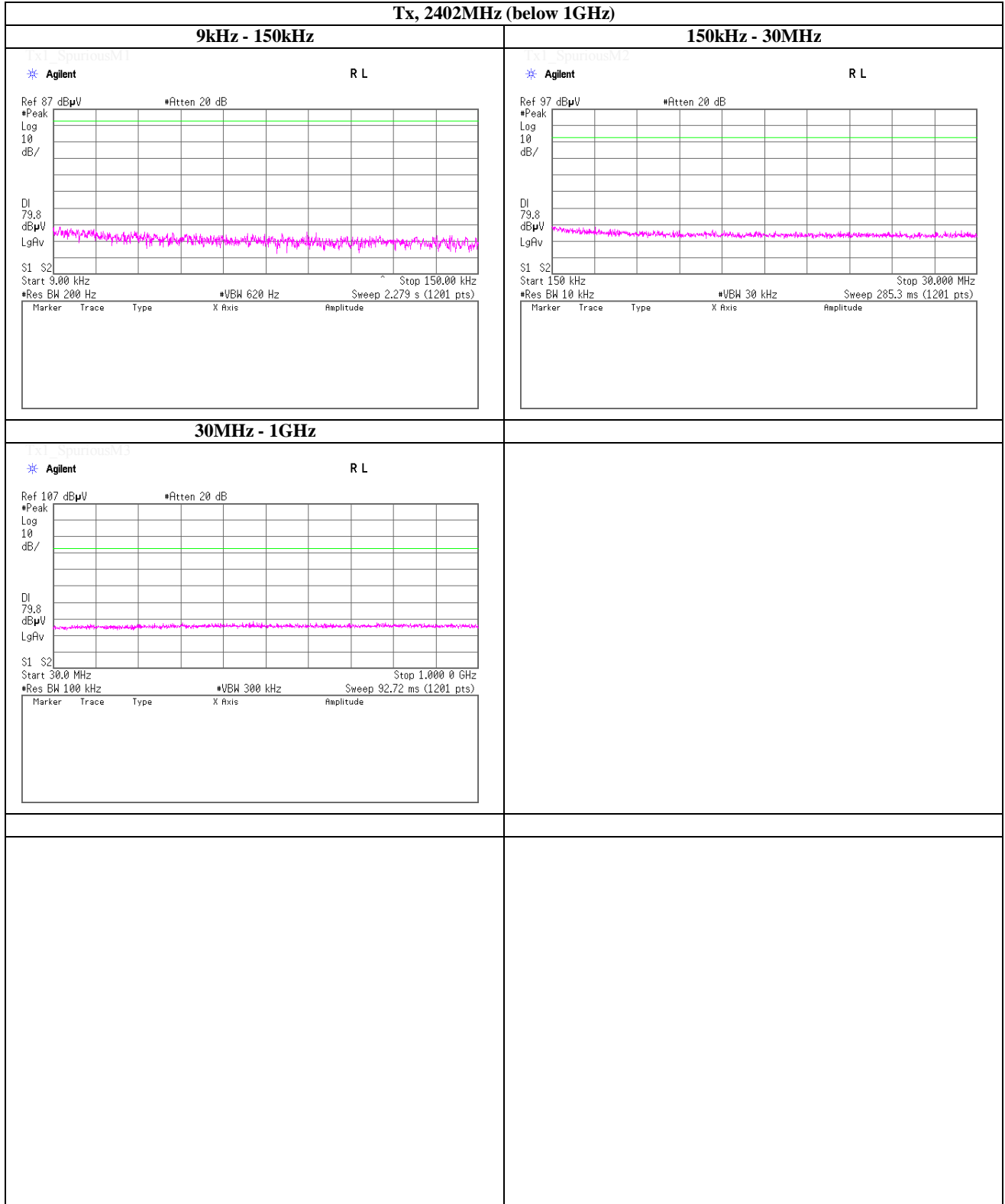
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, BDR, 1100

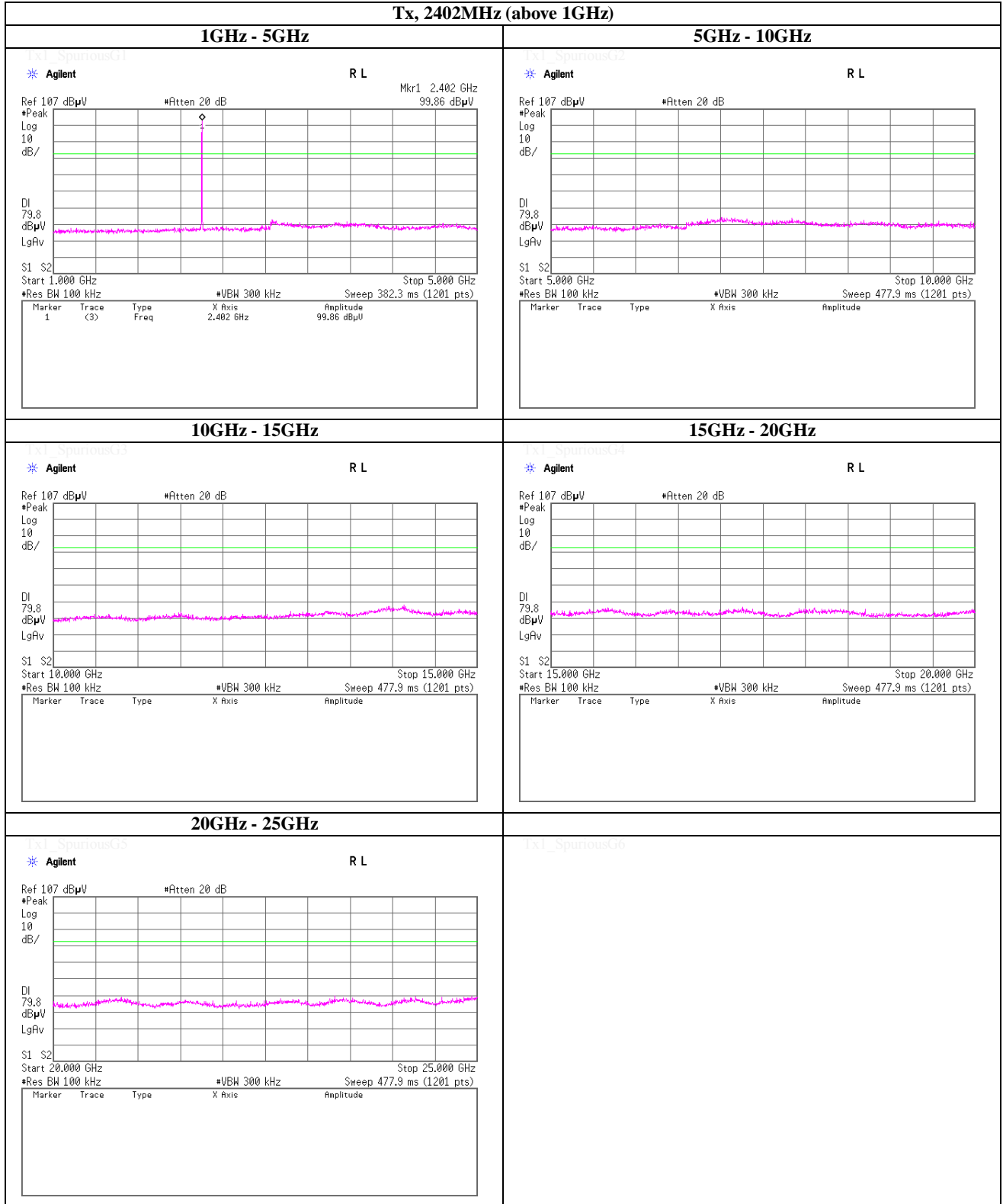
Tx, 2402MHz (below 1GHz)



Spurious emission (Conducted)

Tx, Bluetooth, BDR, 1100

Tx, 2402MHz (above 1GHz)



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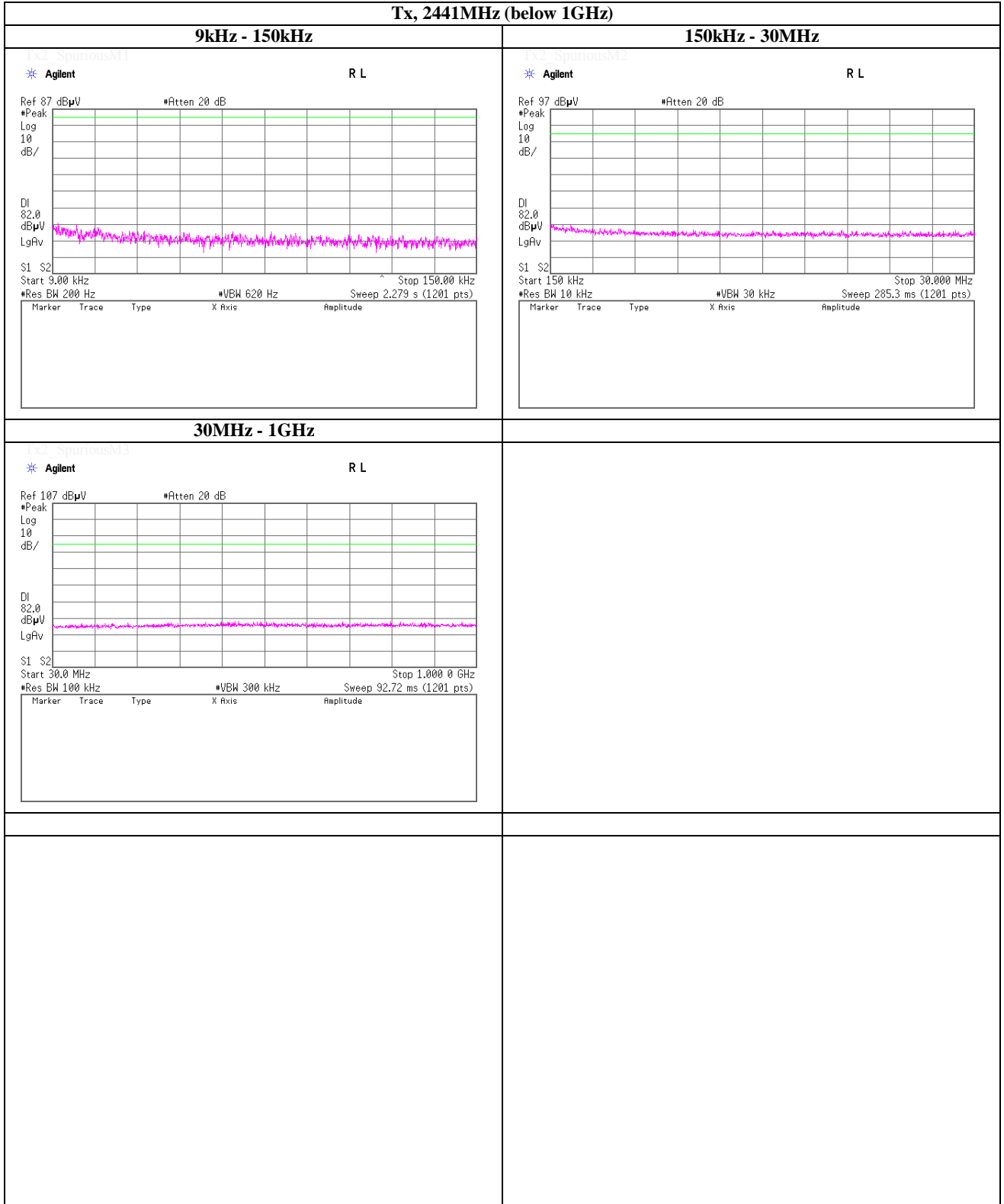
Facsimile : +81 463 50 6401

Test place: UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date: November 12, 2012
 Temperature / Humidity: 25 deg.C , 51 %RH
 Engineer: Hikaru Shirasawa

Spurious emission (Conducted)

Tx, Bluetooth, BDR, 1100

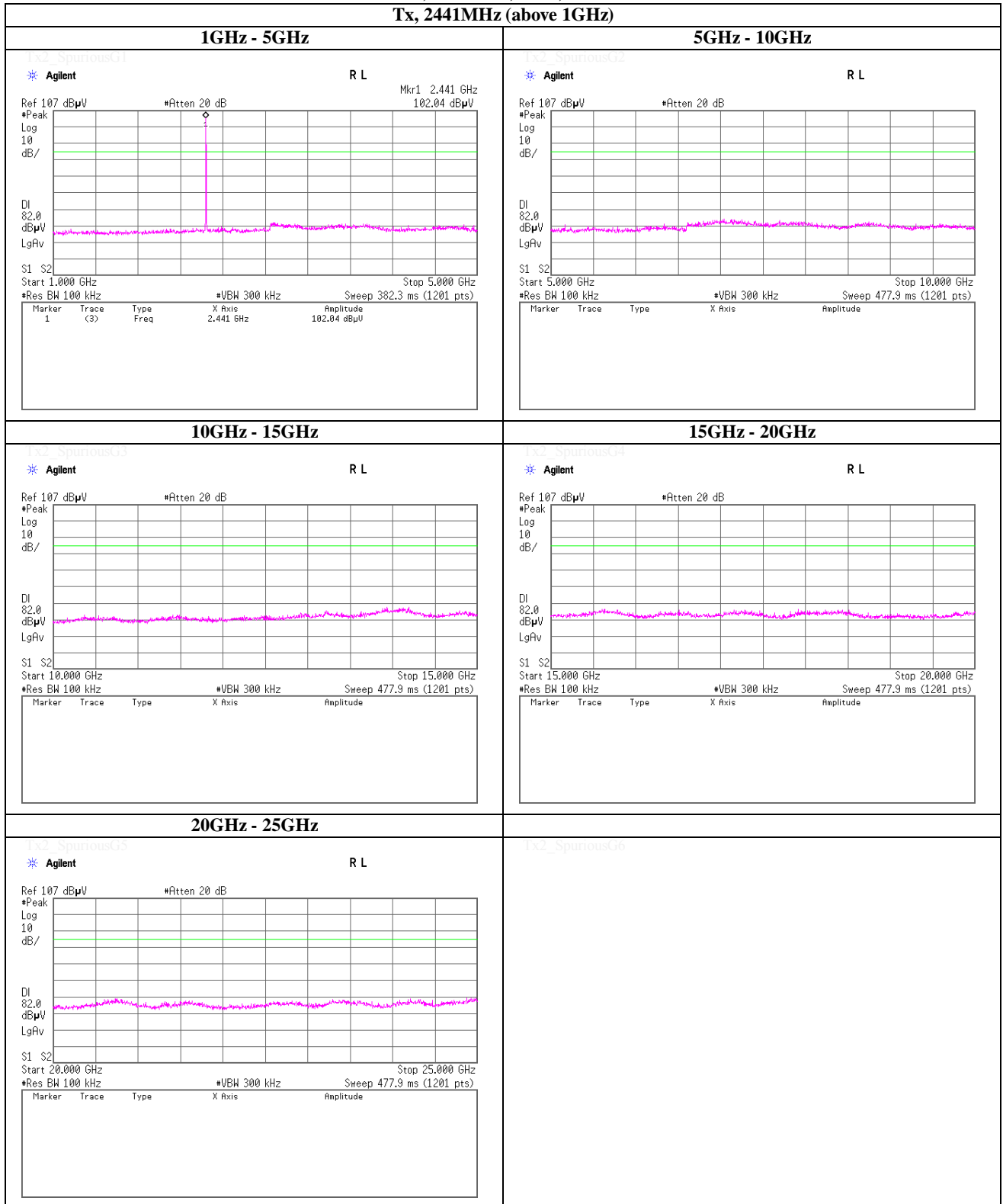
Tx, 2441MHz (below 1GHz)



Spurious emission (Conducted)

Tx, Bluetooth, BDR, 1100

Tx, 2441MHz (above 1GHz)



Spurious emission (Conducted)

Tx, Bluetooth, BDR, 1100

Tx, 2480MHz (below 1GHz)



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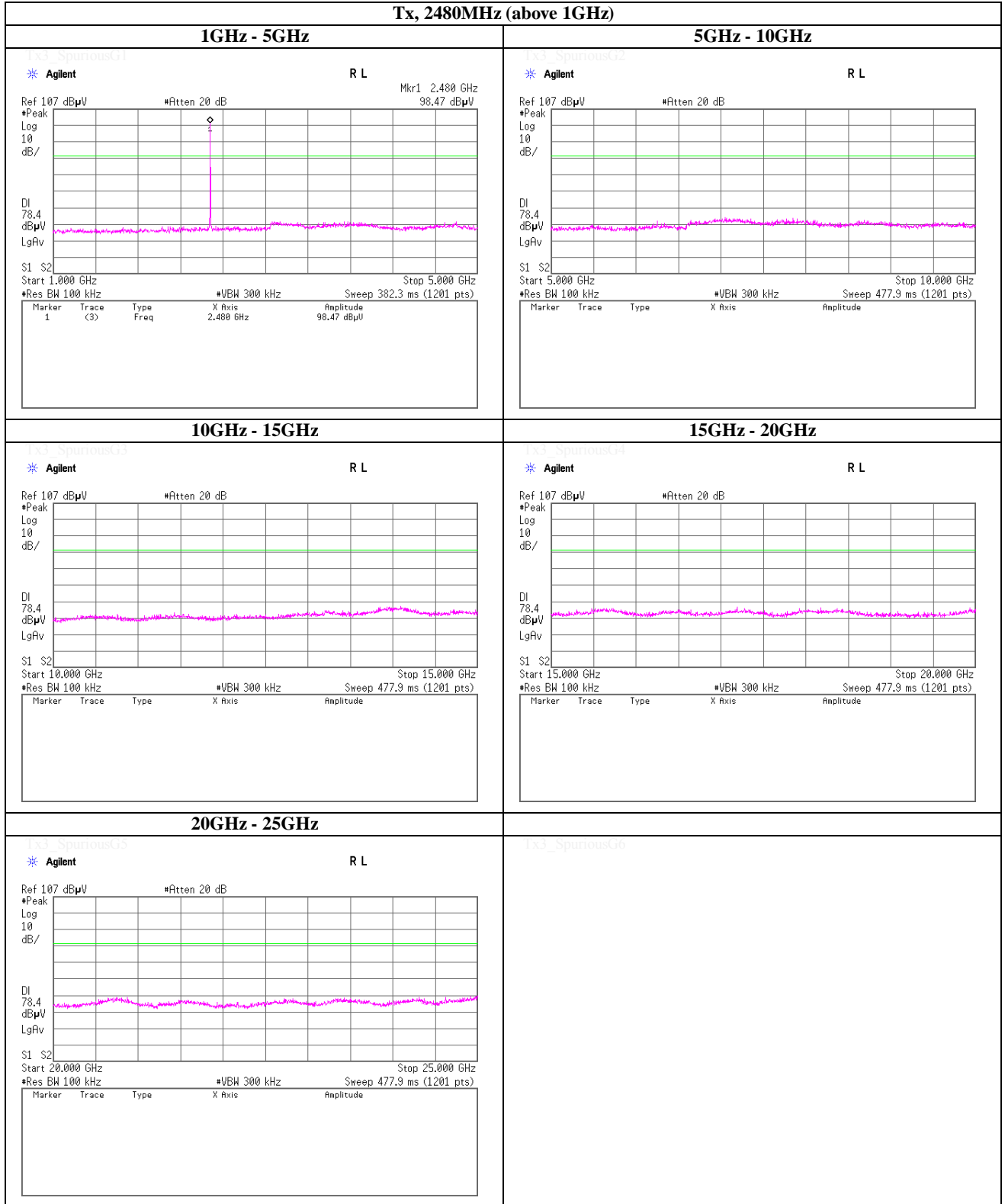
Facsimile : +81 463 50 6401

Test place: UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date: November 12, 2012
 Temperature / Humidity: 25 deg.C , 51 %RH
 Engineer: Hikaru Shirasawa

Spurious emission (Conducted)

Tx, Bluetooth, BDR, 1100

Tx, 2480MHz (above 1GHz)



Spurious emission (Conducted)

Tx, Bluetooth, EDR, 1100

Tx, 2402MHz (below 1GHz)



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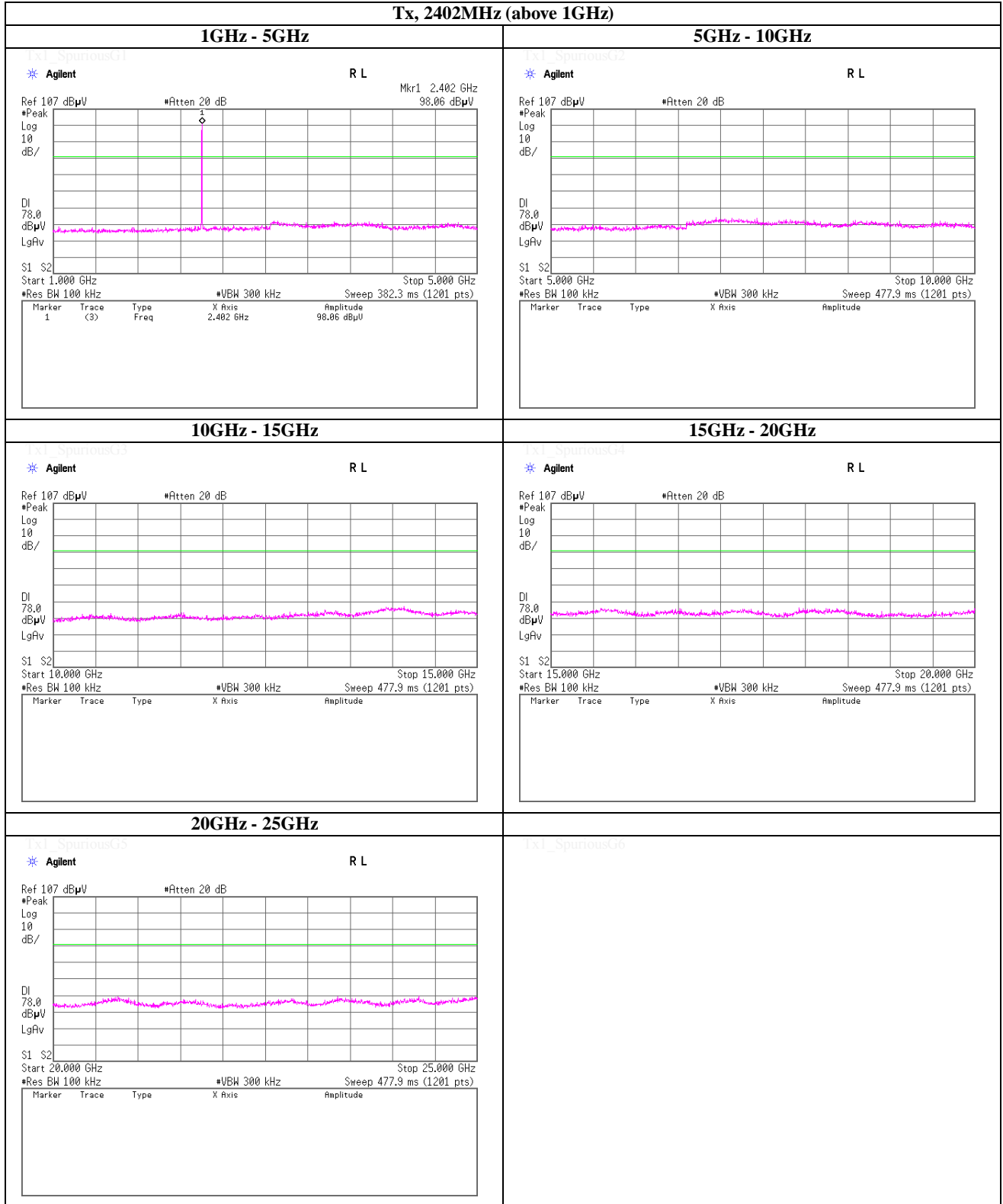
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, 1100

Tx, 2402MHz (above 1GHz)



UL Japan, Inc.

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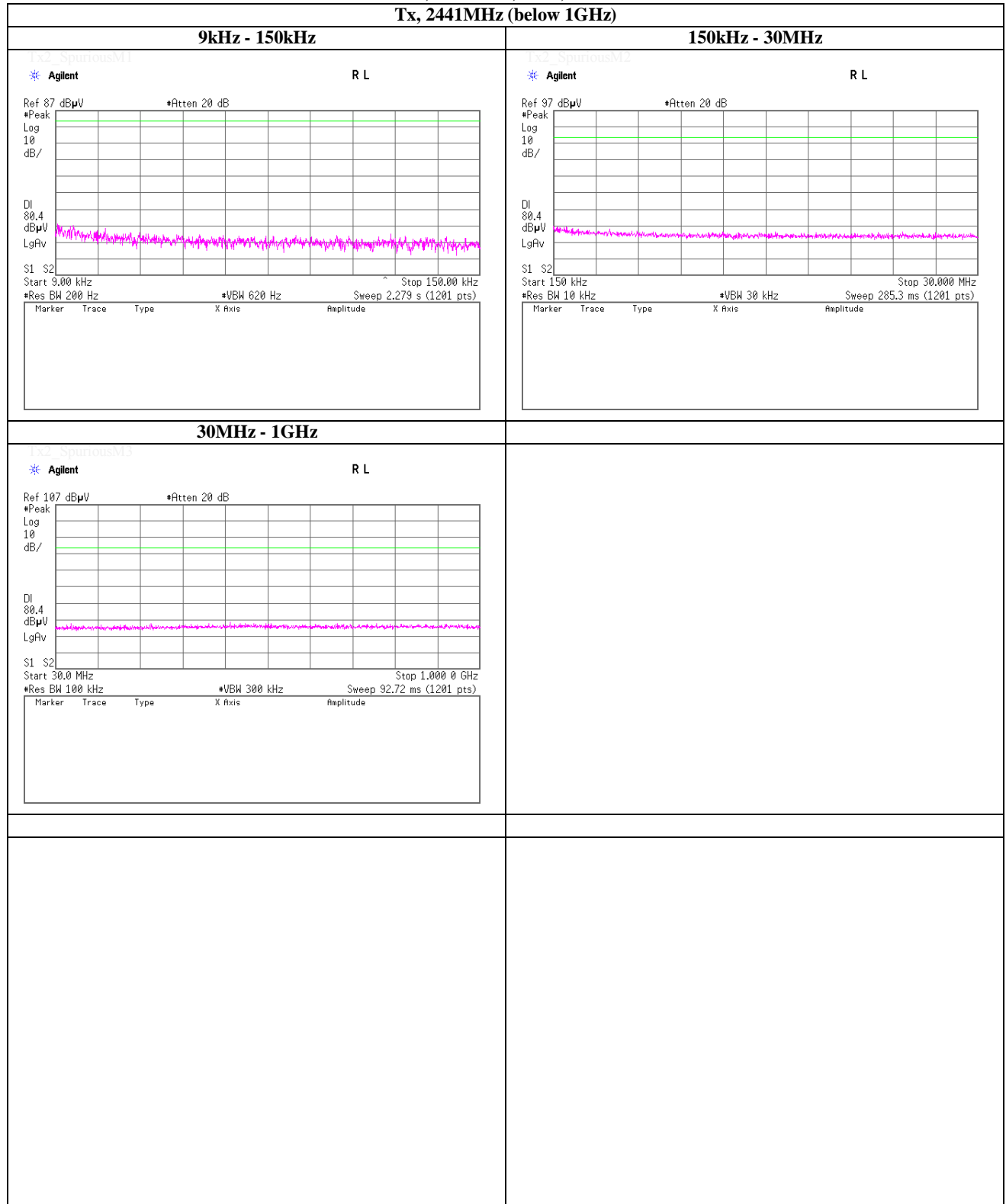
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, 1100

Tx, 2441MHz (below 1GHz)



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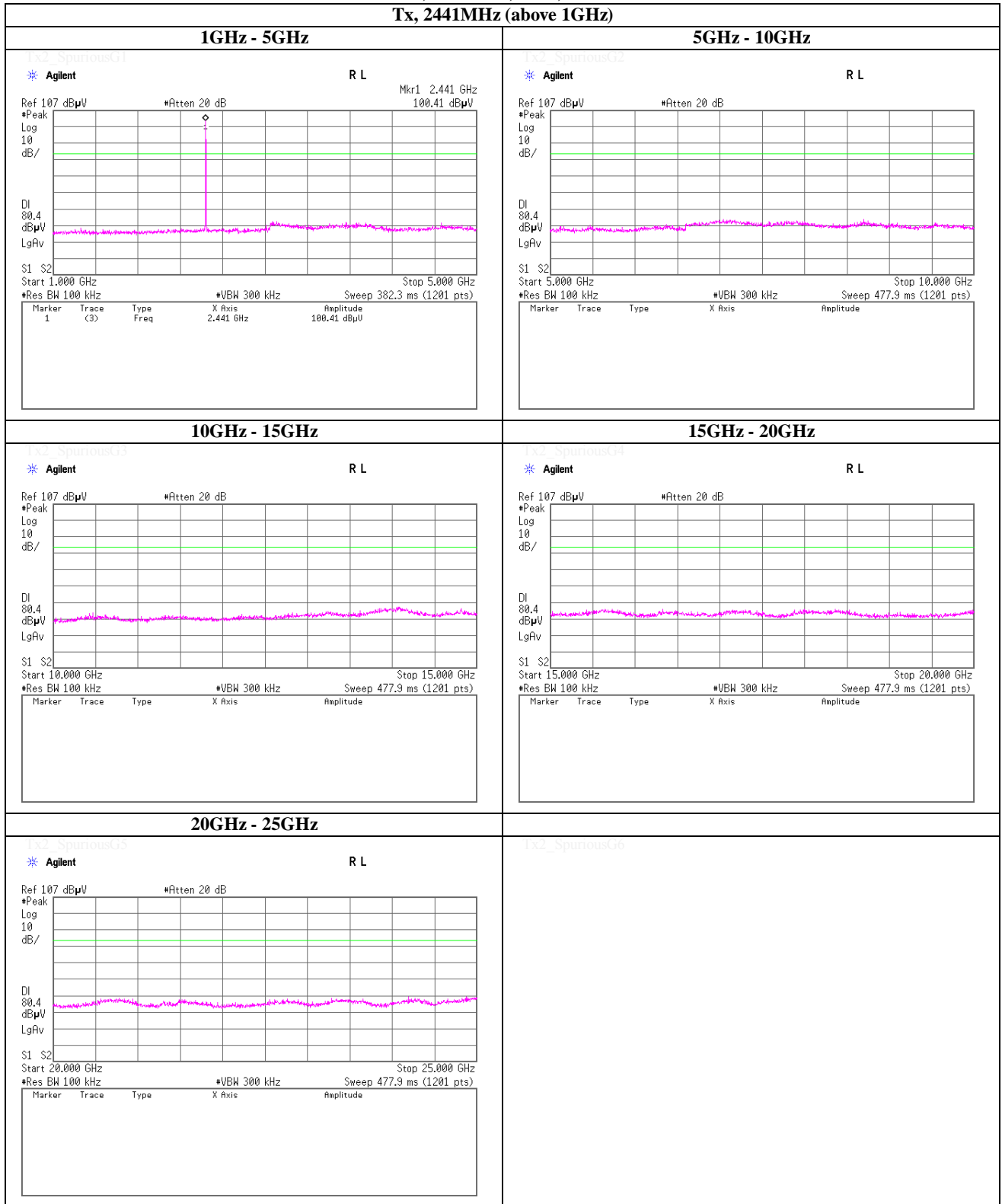
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, 1100

Tx, 2441MHz (above 1GHz)



Spurious emission (Conducted)

Tx, Bluetooth, EDR, 1100

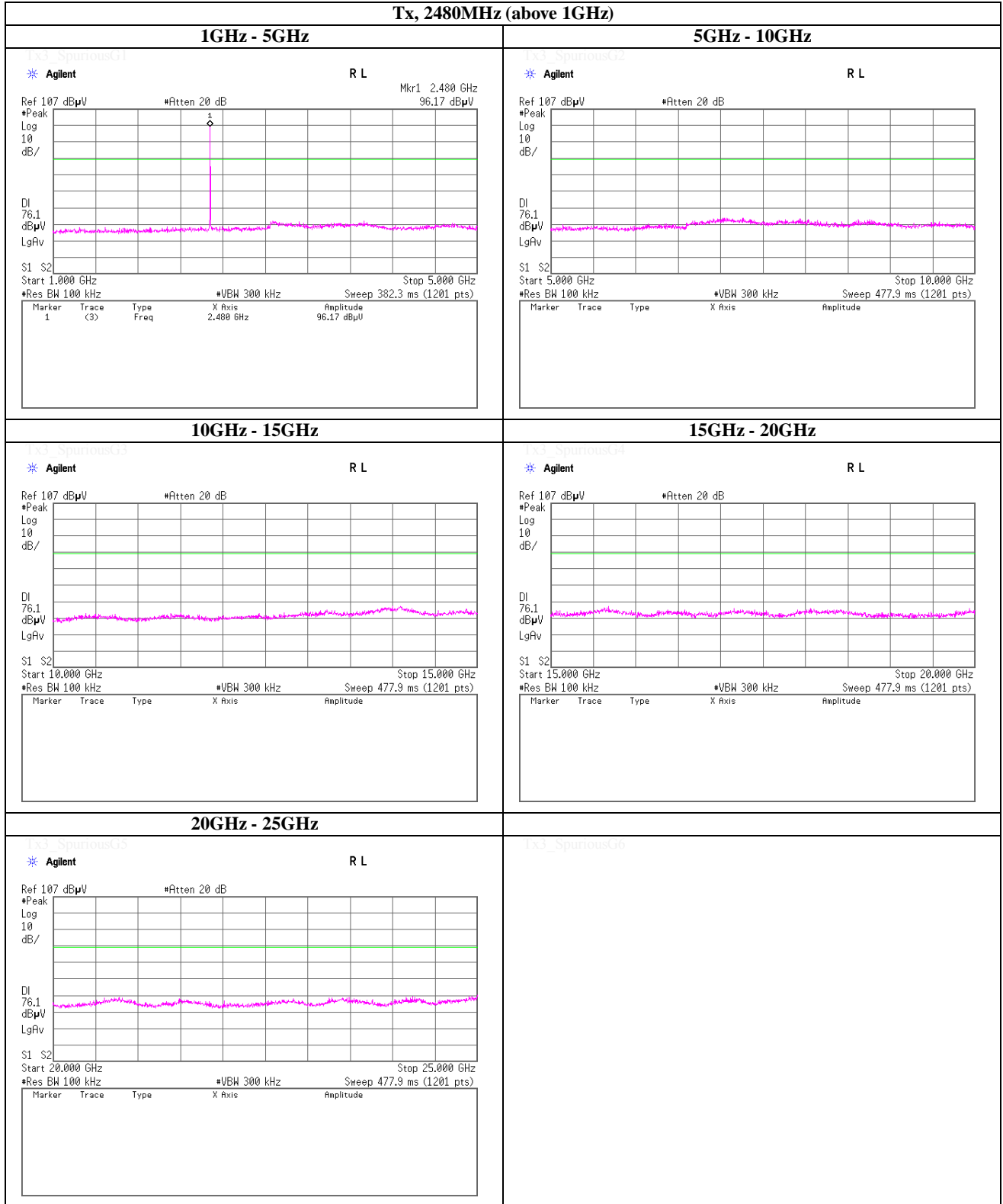
Tx, 2480MHz (below 1GHz)



Spurious emission (Conducted)

Tx, Bluetooth, EDR, 1100

Tx, 2480MHz (above 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

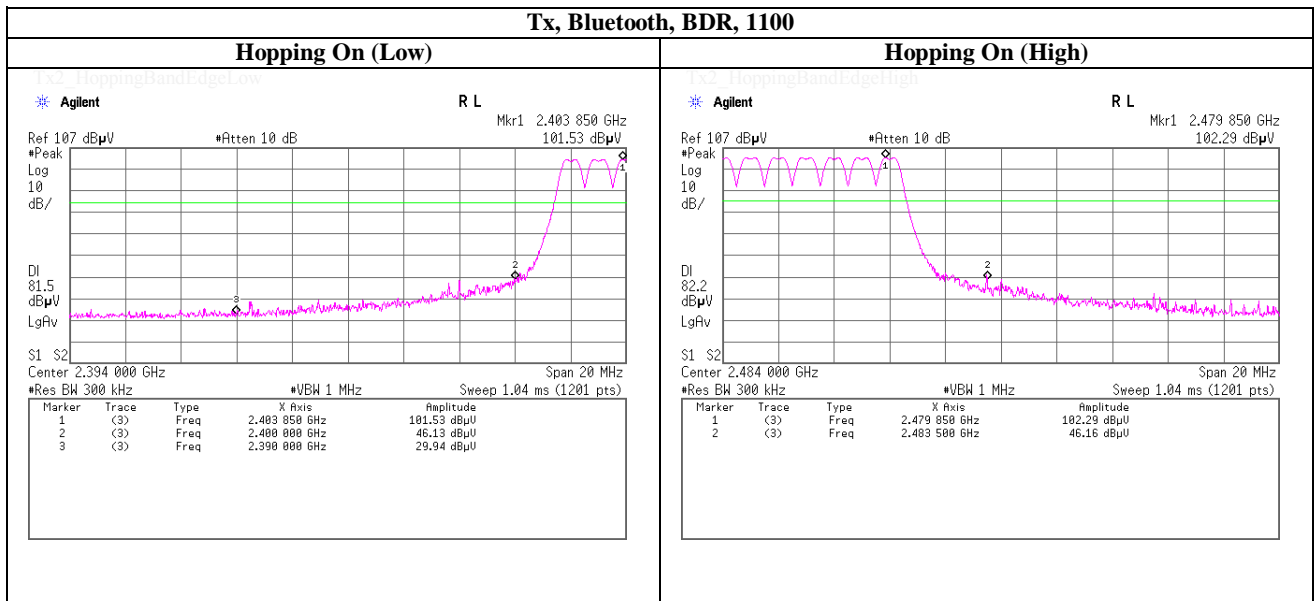
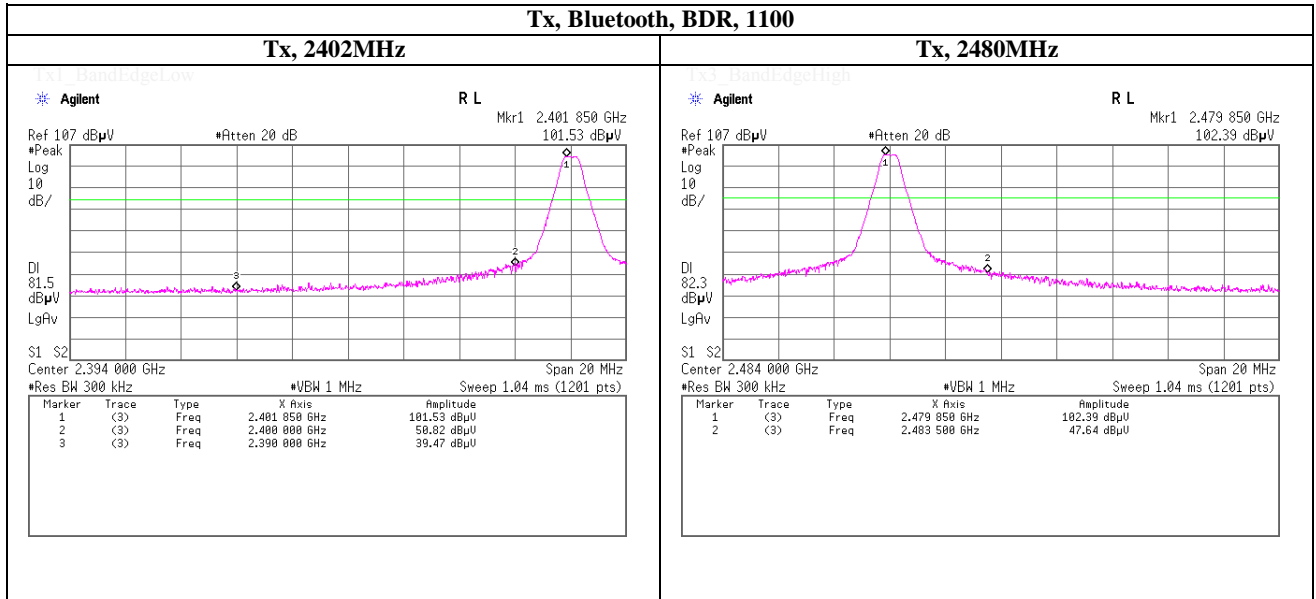
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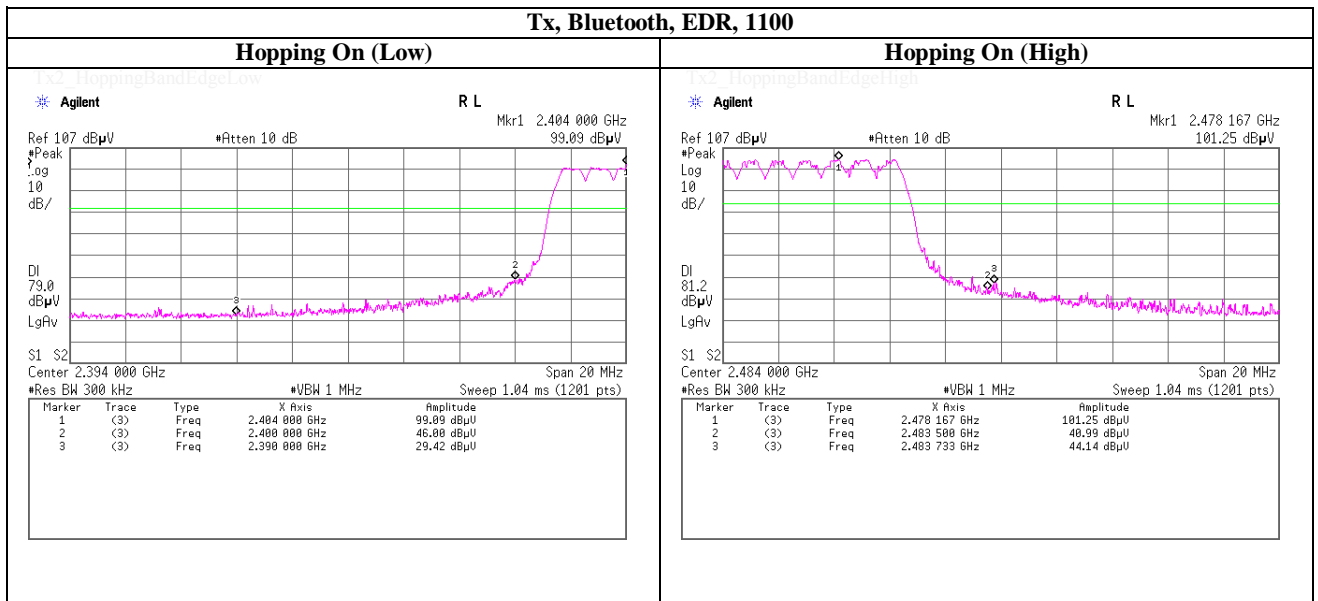
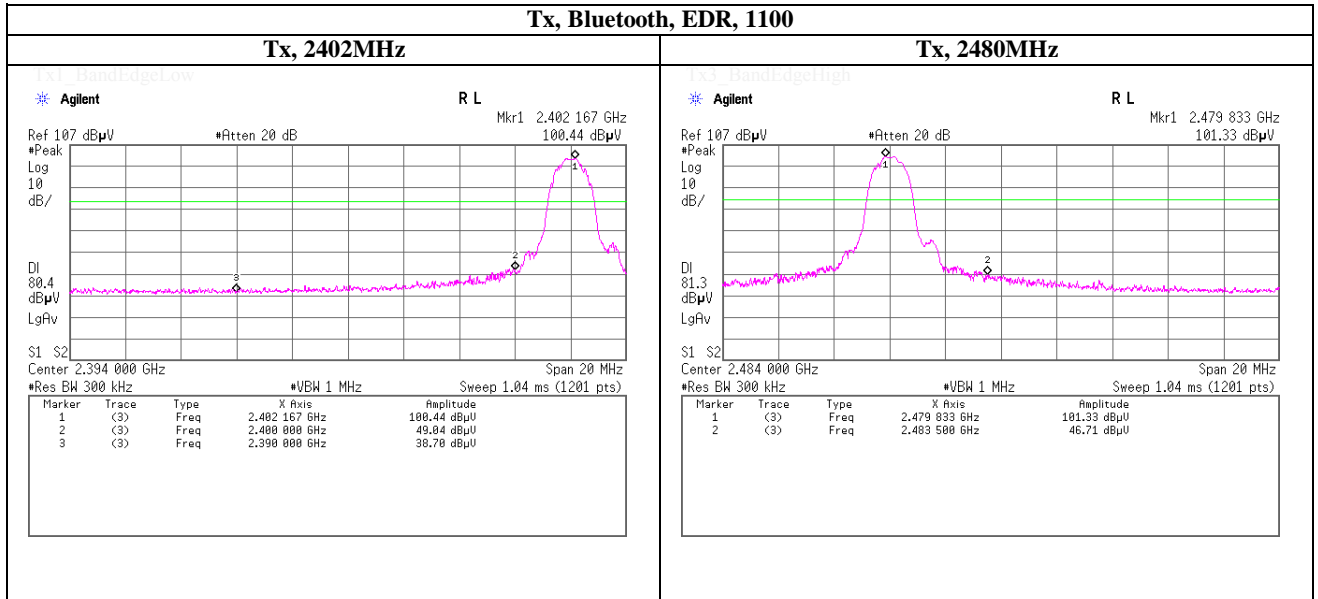
Spurious emission (Conducted)

Band Edge compliace

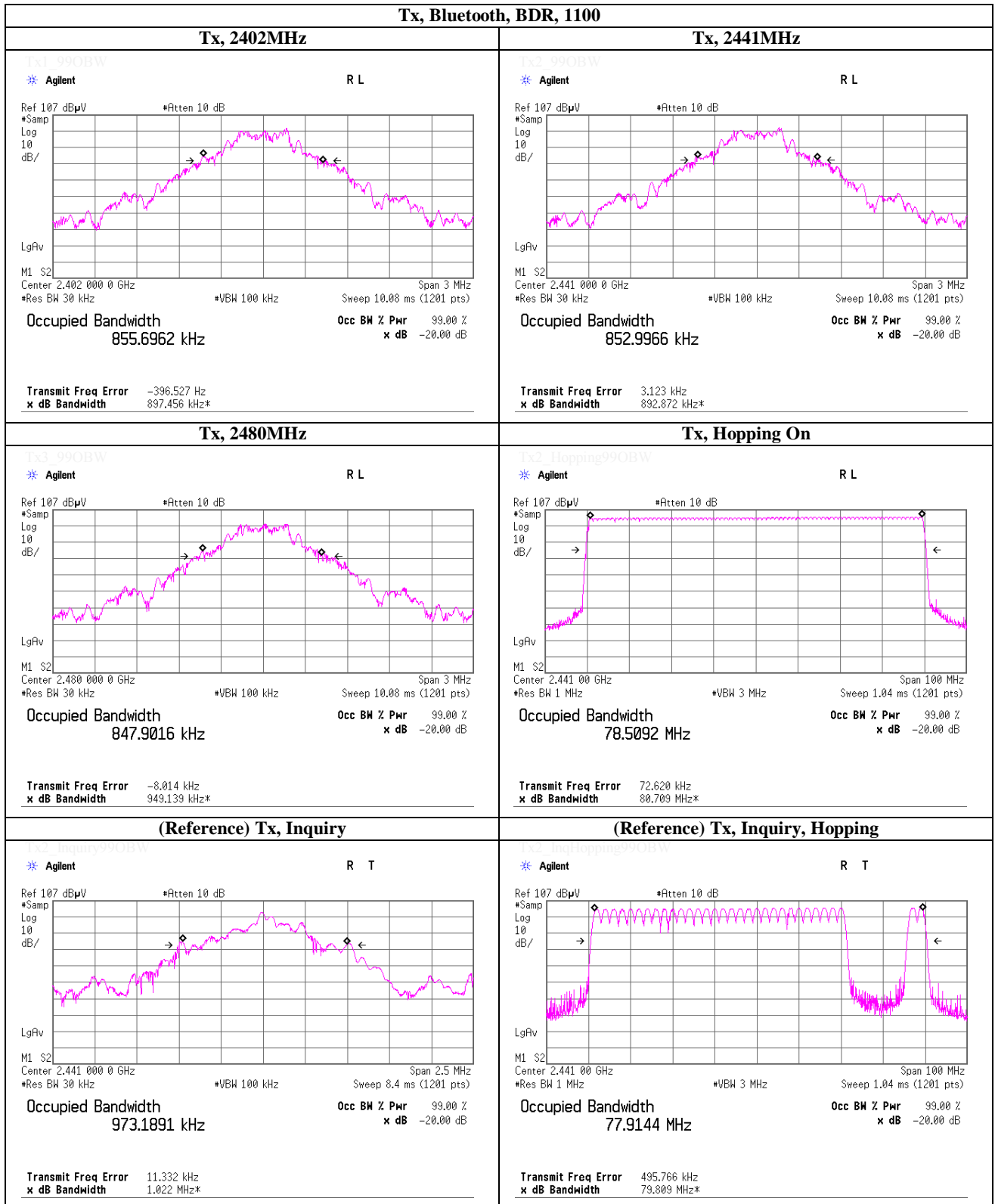


Spurious emission (Conducted)

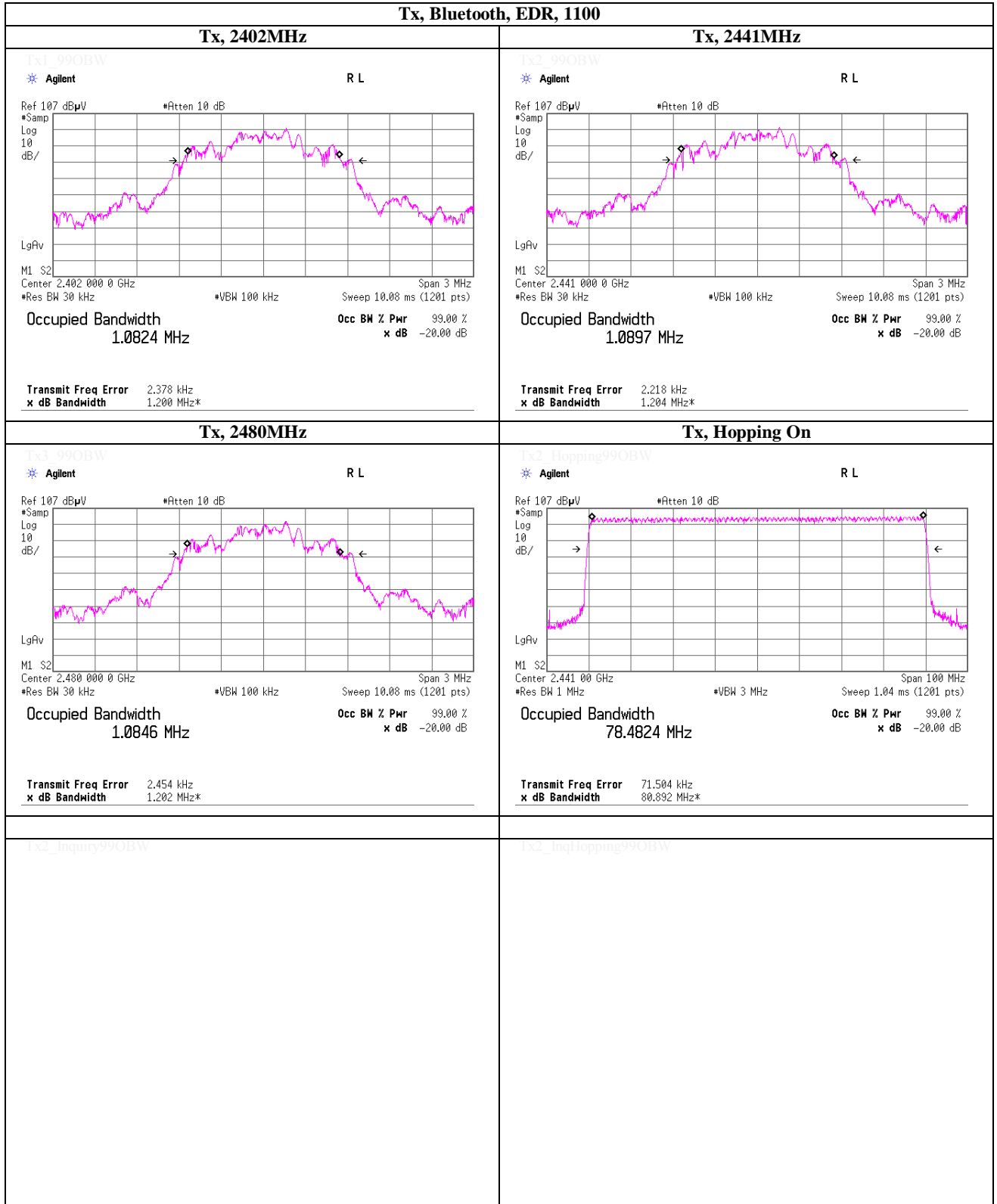
Band Edge compliace



99% Occupied Bandwidth



99% Occupied Bandwidth



Test Report No : 33BE0311-SH-03-B

APPENDIX 2 Test Instruments

EMI test equipment

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|--------------------------------|---------------------------|--|--------------------------------------|-------------------------|-----------|------------------------------------|
| SSA-03 | Spectrum Analyzer | Agilent | E4448A | MY48250152 | AT | 2011/12/05 * 12 |
| SPM-06 | Power Meter | Anritsu | ML2495A | 0850009 | AT | 2012/04/19 * 12 |
| SPSS-03 | Power sensor | Anritsu | MA2411B | 0917063 | AT | 2012/04/19 * 12 |
| SCC-G27 | Coaxial Cable | Junkosha | MWX241-01000KM SKMS | SEP-20-12-00 1 | AT | 2012/09/26 * 12 |
| SAT10-11 | Attenuator | Weinschel Corp. | 54A-10 | 37588 | AT | 2012/04/06 * 12 |
| SOS-09 | Humidity Indicator | A&D | AD-5681 | 4061484 | AT | 2012/03/26 * 12 |
| SAEC-03(NSA) | Semi-Anechoic Chamber | TDK | SAEC-03(NSA) | 3 | RE | 2012/09/21 * 12 |
| SAT10-06 | Attenuator | Agilent | 8493C-010 | 74865 | RE | 2011/12/27 * 12 |
| SFL-02 | Highpass Filter | MICRO-TRONICS | HPM50111 | 051 | RE | 2011/12/27 * 12 |
| SAF-06 | Pre Amplifier | TOYO Corporation | TPA0118-36 | 1440491 | RE | 2012/07/18 * 12 |
| SCC-G03 | Coaxial Cable | Suhner | SUCOFLEX 104A | 46499/4A | RE | 2012/04/10 * 12 |
| SCC-G23 | Coaxial Cable | Suhner | SUCOFLEX 104 | 297342/4 | RE | 2012/05/22 * 12 |
| SHA-03 | Horn Antenna | Schwarzbeck | BBHA9120D | 9120D-739 | RE | 2012/08/17 * 12 |
| SOS-05 | Humidity Indicator | A&D | AD-5681 | 4062518 | RE | 2012/02/06 * 12 |
| STR-03 | Test Receiver | Rohde & Schwarz | ES140 | 100054/040 | RE | 2012/06/14 * 12 |
| SJM-11 | Measure | PROMART | SEN1935 | - | RE | - |
| COTS-SEMI-1 | EMI Software | TSJ | TEPTO-DV(RE,CE, RFLMF) | - | RE | - |
| 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/NS4906 | -/0901-271(RF Selector) | RE | 2012/04/10 * 12 |
| SAF-03 | Pre Amplifier | SONOMA | 310N | 290213 | RE | 2012/02/10 * 12 |
| SAT6-03 | Attenuator | JFW | 50HF-006N | - | RE | 2012/02/10 * 12 |
| SBA-03 | Biconical Antenna | Schwarzbeck | BBA9106 | 91032666 | RE | 2012/10/08 * 12 |
| SLA-03 | Logperiodic Antenna | Schwarzbeck | UHALP9108A | UHALP 9108-A 0901 | RE | 2012/10/08 * 12 |
| SCC-G17 | Coaxial Cable | Suhner | SUCOFLEX 104A | 46291/4A | RE | 2012/03/12 * 12 |
| SAF-08 | Pre Amplifier | TOYO Corporation | HAP18-26W | 00000019 | RE | 2012/03/12 * 12 |
| SHA-04 | Horn Antenna | ETS LINDGREN | 3160-09 | LM3640 | RE | 2012/03/30 * 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 ,