



Test report No. : 10361864S-A
Page : 1 of 44
Issued date : June 26, 2014
Revised date : July 7, 2014
FCC ID : AK8XB950BT

RADIO TEST REPORT

Test Report No.: 10361864S-A

Applicant : Sony Corporation
Type of Equipment : Wireless Stereo Headset
Model No. : MDR-XB950BT
FCC ID : AK8XB950BT
Test regulation : FCC Part15 Subpart C: 2014
Test result : Complied

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4. The test results in this test report are traceable to the national or international standards.
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Date of test: June 6 to 12, 2014

Tested by:

Hikaru Shirasawa
Engineer
Consumer Technology Division

Approved by :

Toyokazu Imamura
Leader
Consumer Technology Division

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10361864S-A

[illegible]

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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 : Shigeru Higai

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless Stereo Headset
Model Number : MDR-XB950BT
Serial Number : Refer to Clause 4.2
Rating : DC3.7V
Country of Mass-production : China
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : June 4, 2014
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: MDR-XB950BT (referred to as the EUT in this report) is a Wireless Stereo Headset.

Clock frequencies: Bluetooth: 26MHz

<Bluetooth Radio part>

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth / Channel spacing : 1MHz & 1MHz
Type of modulation : FHSS (GFSK, $\pi/4$ -DQPSK, 8-DPSK)
Antenna type : Chip Antenna
Antenna connector type : None
Antenna gain : -0.25 dBi
ITU code : F1D, G1D
Operation temperature range : 0 to +40 deg.C

FCC 15.31 (e)

The equipment provides the wireless transmitter with stable power supply (DC1.35V). Therefore, the equipment complies with the requirement.

FCC 15.203

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

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : 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. Refer to the test report: 10361864S-C.

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	8.1 dB Freq.: 12010.000 MHz Polarization: Horizontal Detection: AV Mode: Tx 2402MHz, DH5	Complied

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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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
☐ No.1 semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.2 semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.3 semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☐ No.5 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☒ 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
Band edge compliance & Spurious emission (Conducted) (Radiated)	Transmitting (DH5 / 3-DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	Band edge compliance: 2402MHz, 2480MHz
	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.

Software: CSR Blue Test3, Ver 2.5.0.93
CSR BtCli, Ver 2.5.0.93(for only Inquiry mode)

Power Settings: BDR Ext:23, Int:41, Tx PA Atten:1
EDR Ext:56, Int:43, Tx PA Atten:0

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

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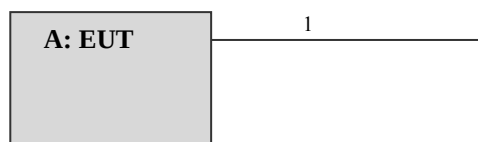
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4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless Stereo Headset	MDR-XB950BT	*1)	Sony	EUT

*1) Antenna port conducted tests: 0313, Radiated emission tests: 0291

List of cables used

No.	Cable name	Length(m)	Shield		Remarks
			Cable	Connector	
1	USB	0.5	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	1-2.8GHz	2.8-25GHz
Horizontal	Y	Y	Y	Z
Vertical	X	X	X	X

*2) with spurious emissions near carrier frequency

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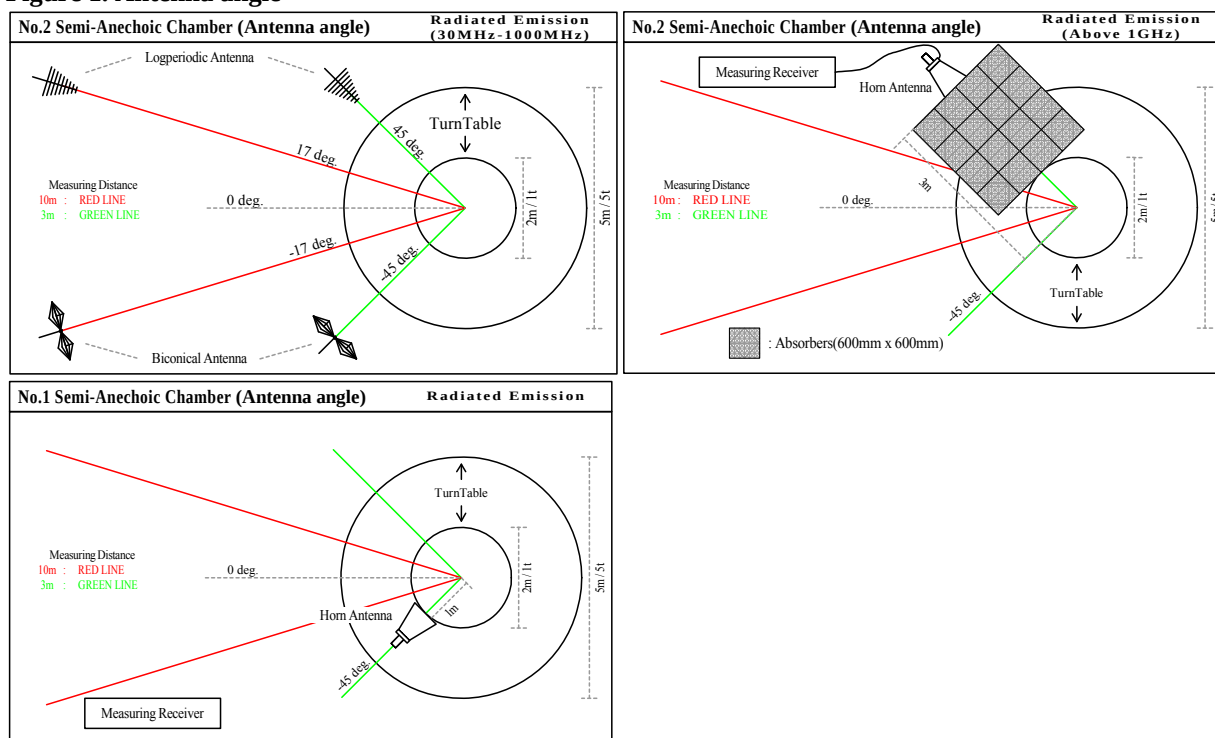
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Figure 1. Antenna angle



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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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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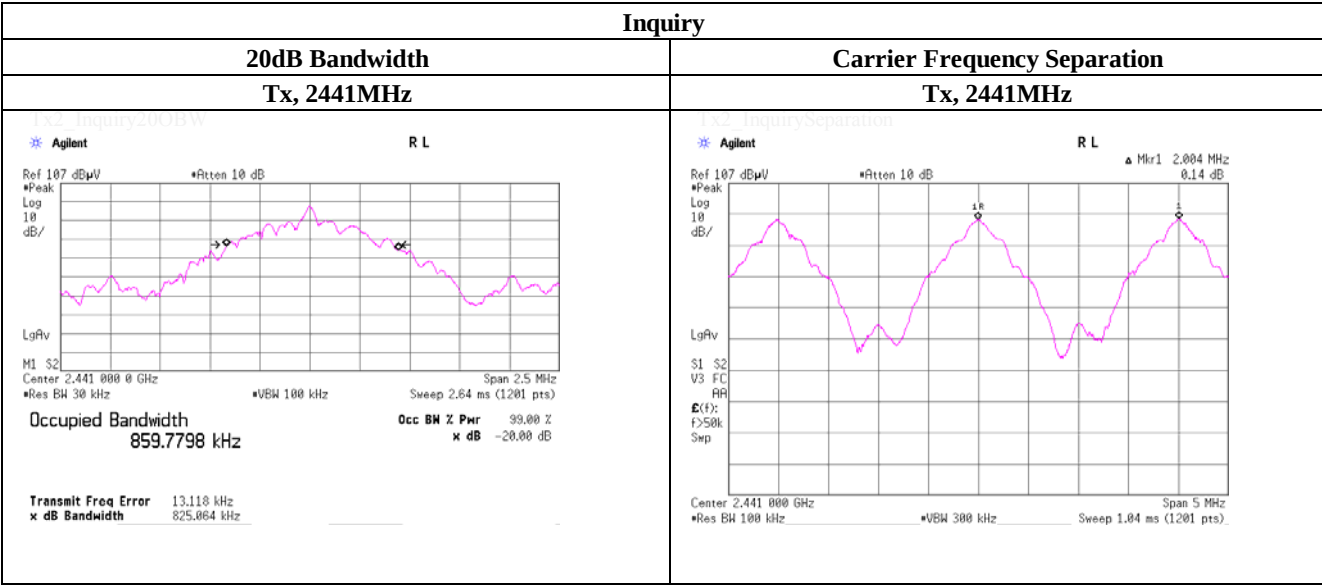
APPENDIX 1: Data of Radio tests

20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	June 6, 2014	
Temperature / Humidity	25 deg.C , 67 %RH	
Engineer	Hikaru Shirasawa	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.938	1.005	>= 0.625
DH5	2441.0	0.938	1.005	>= 0.625
DH5	2480.0	0.942	1.005	>= 0.628
Inquiry	2441.0	0.825	2.004	>= 0.550

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



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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date June 6, 2014
Temperature / Humidity 25 deg.C , 67 %RH
Engineer Hikaru Shirasawa

20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9

20dB Bandwidth	Carrier Frequency Separation
Tx, 2402MHz Agilent R L Ref 107 dBμV Peak Log 10 dB LgAv MI S2 Center 2.402 000 0 GHz Res BW 30 kHz VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 860.5746 kHz Occ BW X Pwr 99.00 X x dB -20.00 dB Transmit Freq Error 13.319 kHz x dB Bandwidth 937.910 kHz	Tx, 2402MHz Agilent R L Ref 107 dBμV Peak Log 5 dB LgAv MI S2 Center 2.402 750 0 GHz Res BW 100 kHz VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz Mir1 1.005 0 MHz 0.05 dB x dB Bandwidth 937.910 kHz
Tx, 2441MHz Agilent R L Ref 107 dBμV Peak Log 10 dB LgAv MI S2 Center 2.441 000 0 GHz Res BW 30 kHz VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 852.5719 kHz Occ BW X Pwr 99.00 X x dB -20.00 dB Transmit Freq Error -5.683 kHz x dB Bandwidth 938.218 kHz	Tx, 2441MHz Agilent R L Ref 107 dBμV Peak Log 5 dB LgAv MI S2 Center 2.441 000 0 GHz Res BW 100 kHz VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz Mir1 1.005 0 MHz 0.06 dB x dB Bandwidth 938.218 kHz
Tx, 2480MHz Agilent R L Ref 107 dBμV Peak Log 10 dB LgAv MI S2 Center 2.480 000 0 GHz Res BW 30 kHz VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 857.2023 kHz Occ BW X Pwr 99.00 X x dB -20.00 dB Transmit Freq Error -4.112 kHz x dB Bandwidth 942.820 kHz	Tx, 2480MHz Agilent R L Ref 107 dBμV Peak Log 5 dB LgAv MI S2 Center 2.479 250 0 GHz Res BW 100 kHz VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz Mir1 1.005 0 MHz 0.07 dB x dB Bandwidth 942.820 kHz

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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date June 6, 2014
Temperature / Humidity 25 deg.C , 67 %RH
Engineer Hikaru Shirasawa
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	1.270	1.005	>= 0.847
3-DH5	2441.0	1.262	1.005	>= 0.841
3-DH5	2480.0	1.263	1.005	>= 0.842

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

No limit applies to 20dB Bandwidth.

Tx2_Inquiry20OBW

Tx2_InquirySeparation

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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date June 6, 2014
Temperature / Humidity 25 deg.C , 67 %RH
Engineer Hikaru Shirasawa

20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9

20dB Bandwidth	Carrier Frequency Separation
Tx, 2402MHz	Tx, 2402MHz
Agilent RL Ref 107 dBμV *Atten 10 dB MI S2 Center 2.402 000 0 GHz *Res BW 30 kHz *VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1527 MHz Transmit Freq Error 12.097 kHz x dB Bandwidth 1.270 MHz	Agilent RL Ref 107 dBμV *Atten 10 dB Mkr1 1.005 0 MHz 0.02 dB MI S2 Center 2.402 750 0 GHz *Res BW 100 kHz *VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz
Tx, 2441MHz	Tx, 2441MHz
Agilent RL Ref 107 dBμV *Atten 10 dB MI S2 Center 2.441 000 0 GHz *Res BW 30 kHz *VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1512 MHz Transmit Freq Error 470.229 Hz x dB Bandwidth 1.262 MHz	Agilent RL Ref 107 dBμV *Atten 10 dB Mkr1 1.005 0 MHz 0.07 dB MI S2 Center 2.441 000 0 GHz *Res BW 100 kHz *VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz
Tx, 2480MHz	Tx, 2480MHz
Agilent RL Ref 107 dBμV *Atten 10 dB MI S2 Center 2.480 000 0 GHz *Res BW 30 kHz *VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1525 MHz Transmit Freq Error 1.177 kHz x dB Bandwidth 1.263 MHz	Agilent RL Ref 107 dBμV *Atten 10 dB Mkr1 1.005 0 MHz 0.03 dB MI S2 Center 2.479 250 0 GHz *Res BW 100 kHz *VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz

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Number of Hopping Frequency

Test place

UL Japan, Inc. Shonan EMC Lab.

No.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

25 deg.C , 67 %RH

Engineer

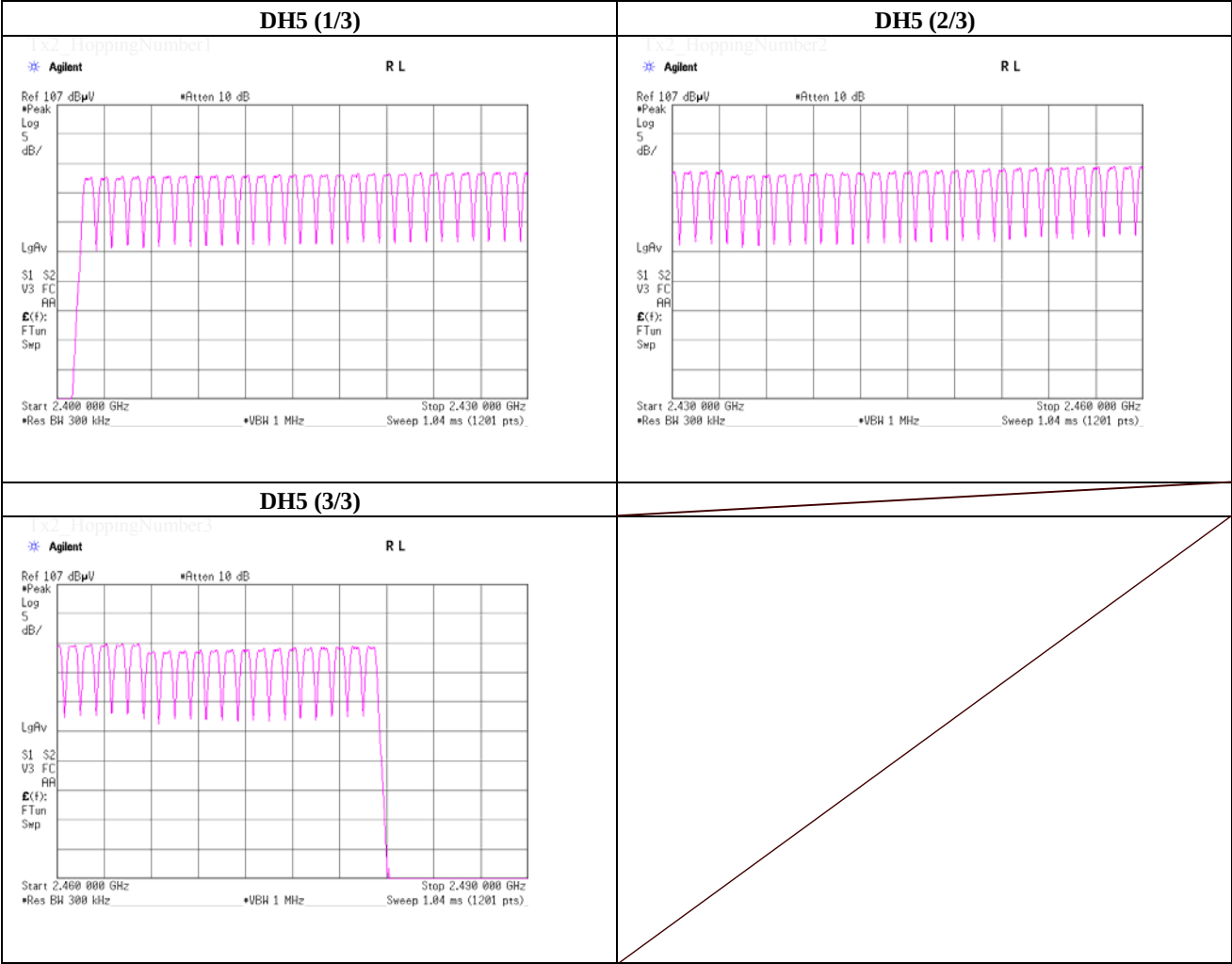
Hikaru Shirasawa

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.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

25 deg.C , 67 %RH

Engineer

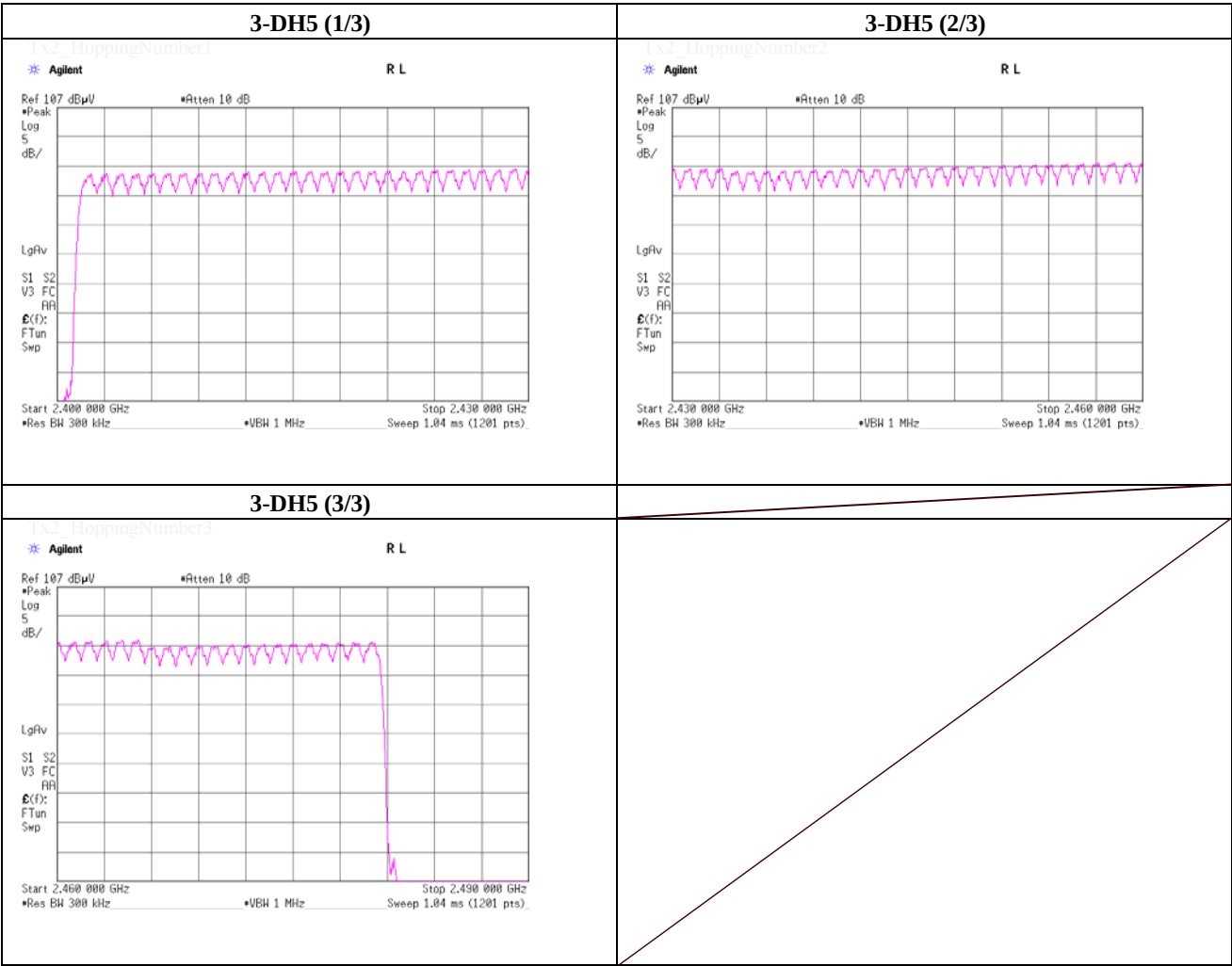
Hikaru Shirasawa

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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Number of Hopping Frequency

Test place

Date

Temperature / Humidity

Engineer

Mode

UL Japan, Inc. Shonan EMC Lab.

June 6, 2014

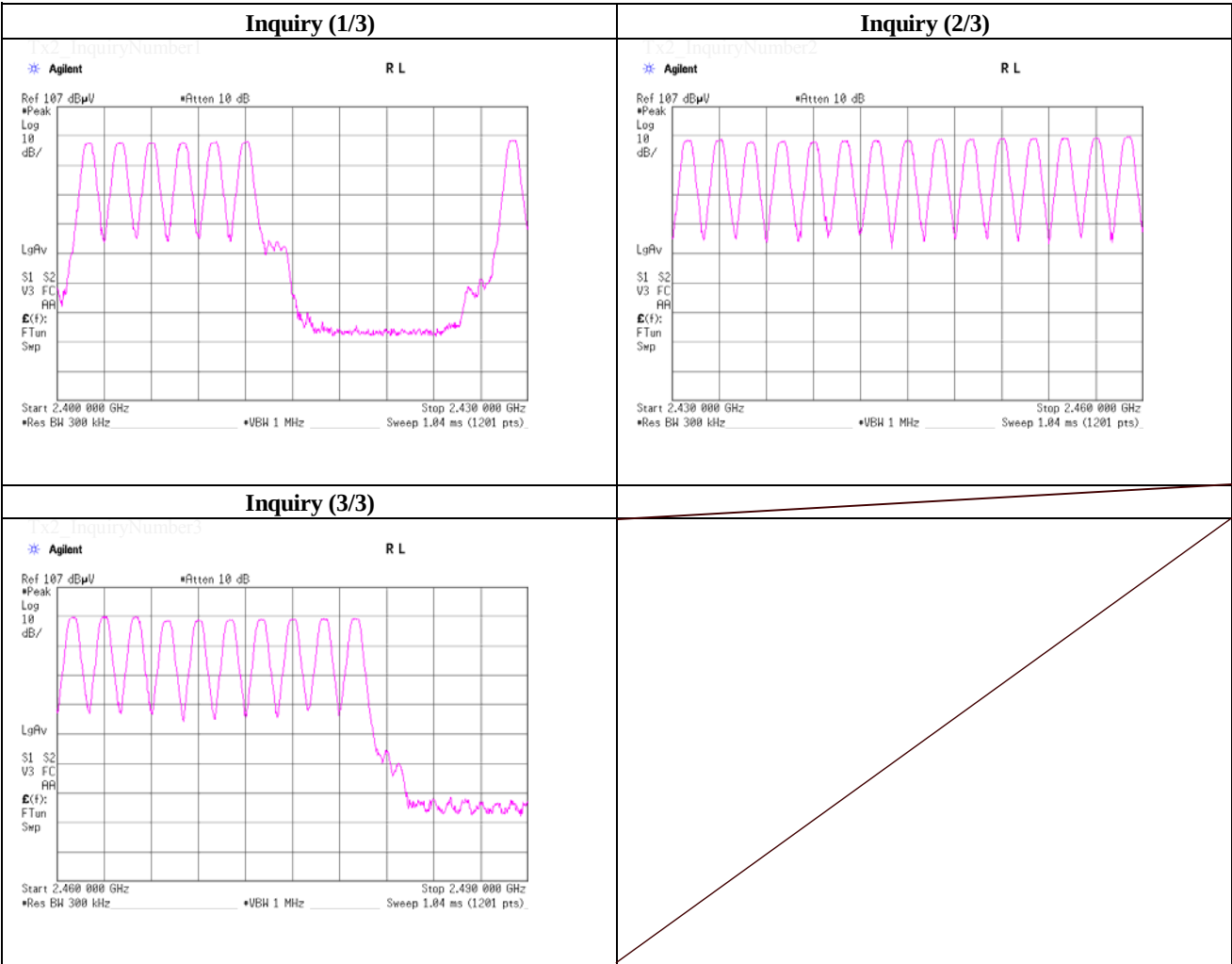
25 deg.C , 67 %RH

Hikaru Shirasawa

Tx, Bluetooth, Inquiry

No.1 Measurement Room

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



Dwell Time

Test place

UL Japan, Inc. Shonan EMC Lab.

No.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

25 deg.C , 67 %RH

Engineer

Hikaru Shirasawa

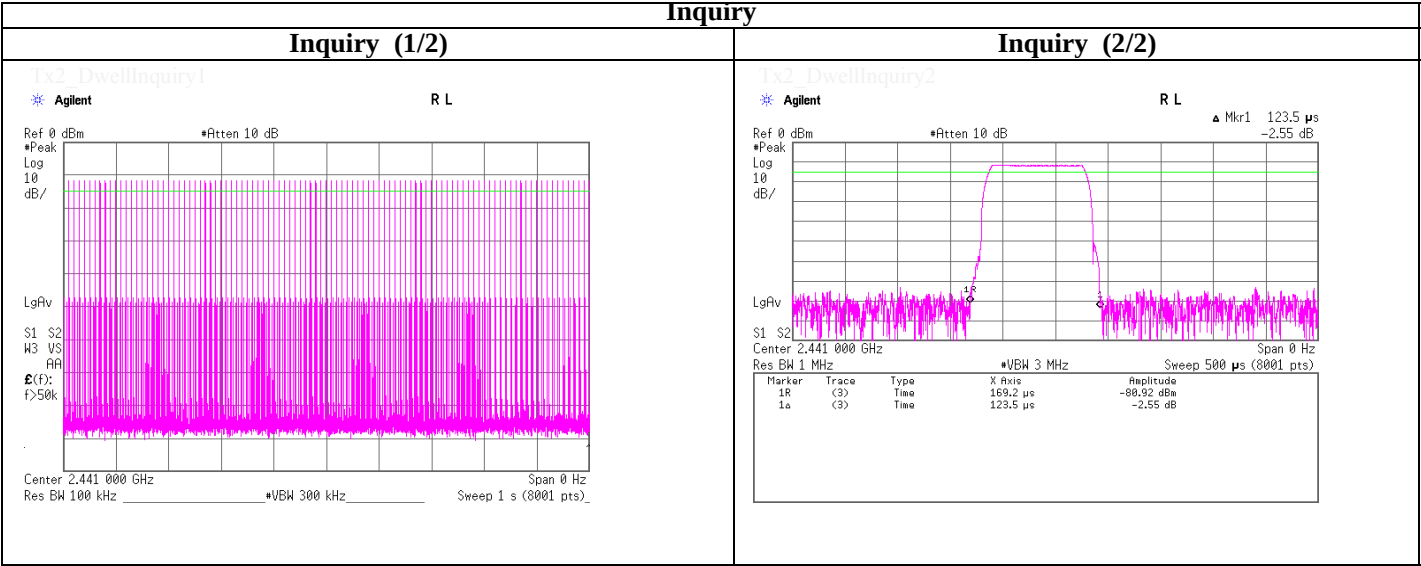
Mode

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	50.0	/ 5.0 sec. x 31.6 sec. = 316 times	0.423	134	400
DH3	26.0	/ 5.0 sec. x 31.6 sec. = 165 times	1.679	277	400
DH5	17.0	/ 5.0 sec. x 31.6 sec. = 108 times	2.926	316	400
Inquiry	100.0	/ 1.0 sec. x 12.8 sec. = 1280 times	0.124	158	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 $N=79$.



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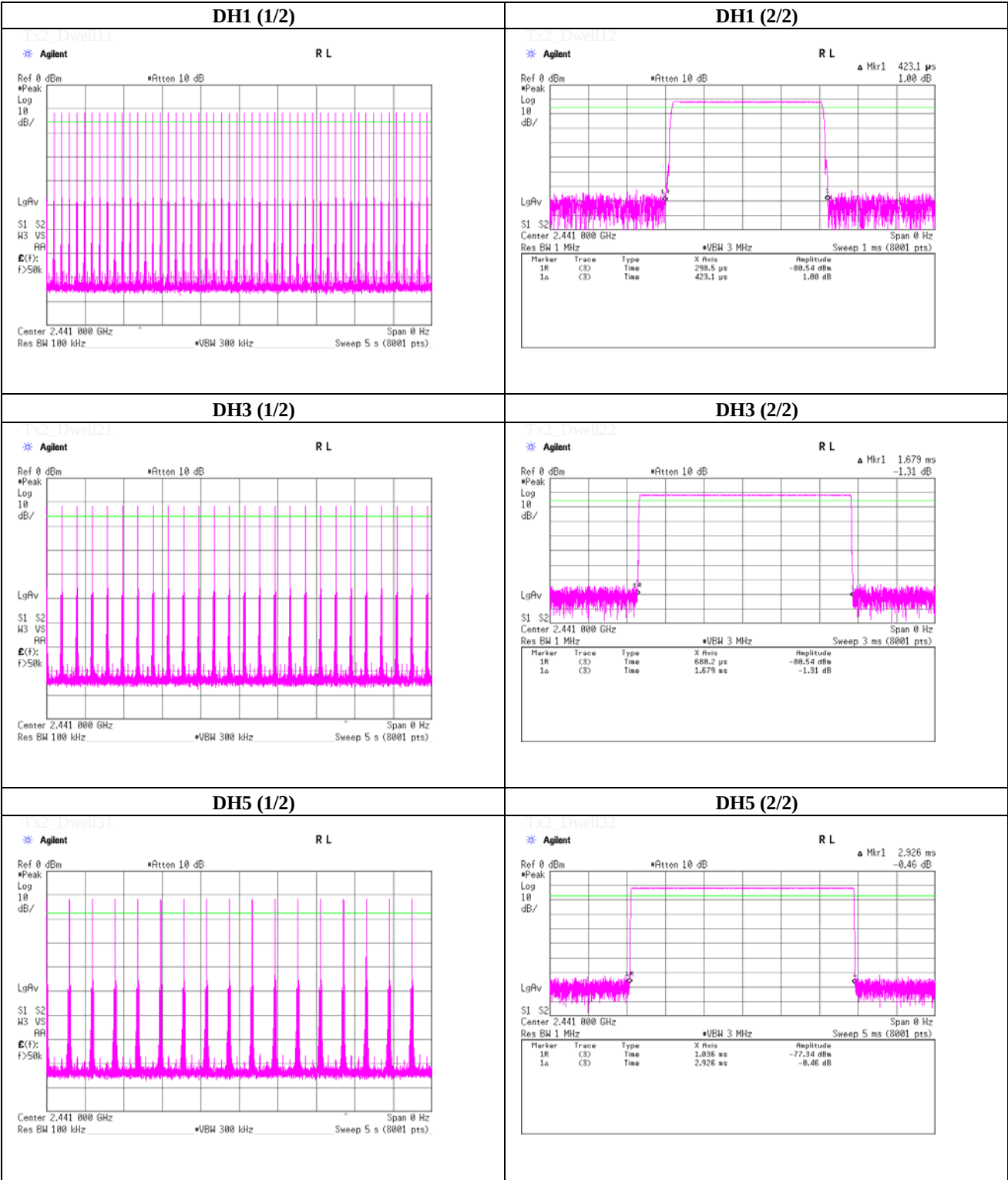
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Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date June 6, 2014
Temperature / Humidity 25 deg.C , 67 %RH
Engineer Hikaru Shirasawa

Dwell time

Tx, Bluetooth, BDR, PRBS9



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date June 6, 2014
 Temperature / Humidity 25 deg.C , 67 %RH
 Engineer Hikaru Shirasawa
 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	50.0	/ 5.0 sec.	x 31.6 sec. = 316 times	0.436	138	400
3-DH3	26.0	/ 5.0 sec.	x 31.6 sec. = 165 times	1.686	278	400
3-DH5	17.0	/ 5.0 sec.	x 31.6 sec. = 108 times	2.940	318	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 $N=79$.

Tx2_DwellInquiry1

Tx2_DwellInquiry2

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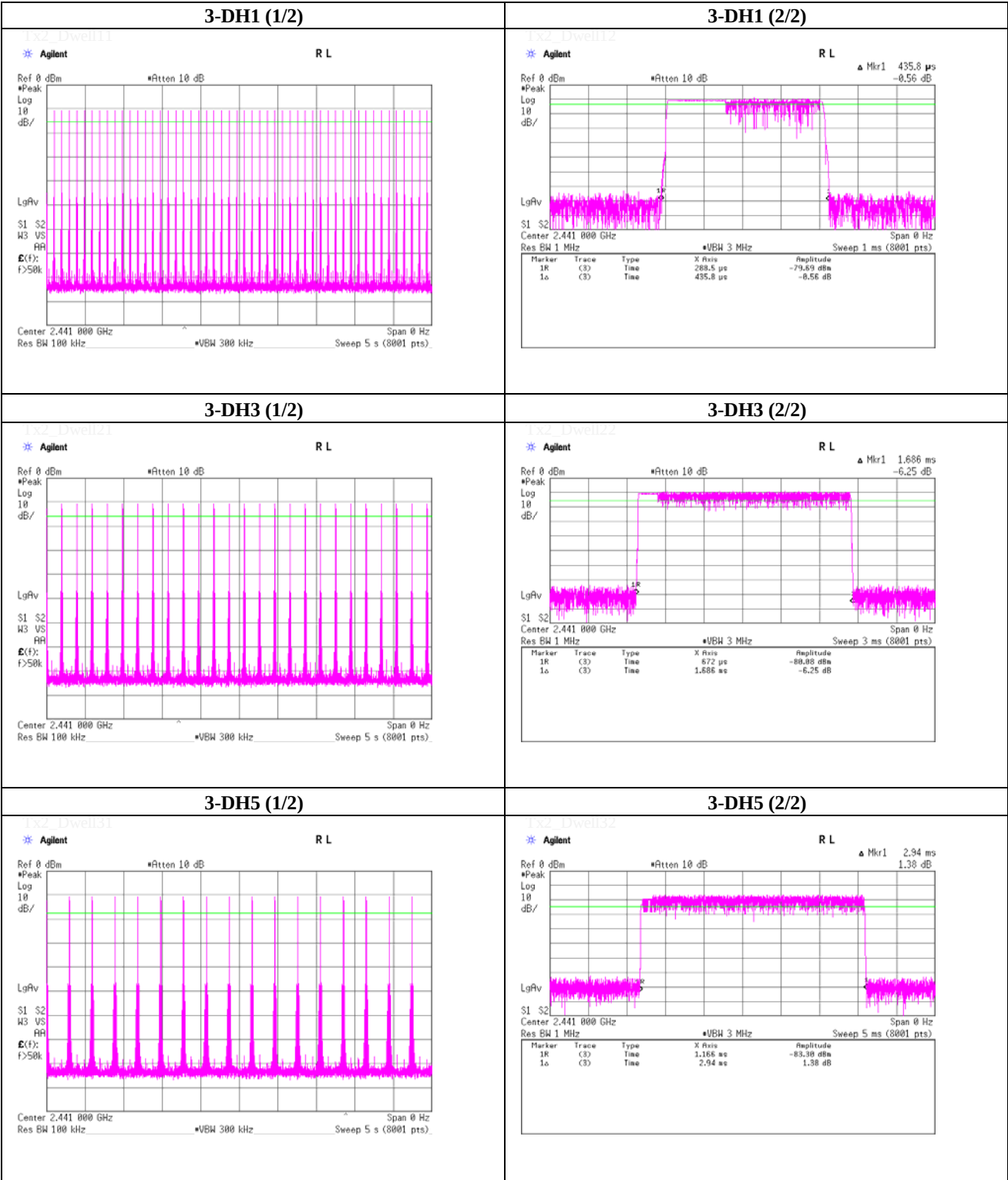
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date June 6, 2014
Temperature / Humidity 25 deg.C , 67 %RH
Engineer Hikaru Shirasawa

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.1 Measurement Room
 Date June 6, 2014
 Temperature / Humidity 25 deg.C , 67 %RH
 Engineer Hikaru Shirasawa
 Mode Tx, Bluetooth

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

	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-12.23	1.38	9.65	-1.20	0.76	20.97	125	22.17
DH5	2441.0	-11.53	1.39	9.66	-0.48	0.90	20.97	125	21.45
DH5	2480.0	-10.34	1.40	9.66	0.72	1.18	20.97	125	20.25
2-DH5	2402.0	-10.76	1.38	9.65	0.27	1.06	20.97	125	20.70
2-DH5	2441.0	-9.87	1.39	9.66	1.18	1.31	20.97	125	19.79
2-DH5	2480.0	-8.67	1.40	9.66	2.39	1.73	20.97	125	18.58
3-DH5	2402.0	-10.40	1.38	9.65	0.63	1.16	20.97	125	20.34
3-DH5	2441.0	-9.55	1.39	9.66	1.50	1.41	20.97	125	19.47
3-DH5	2480.0	-8.33	1.40	9.66	2.73	1.87	20.97	125	18.24

Sample Calculation:

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

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Radiated Emission

Test place No.2 Semi Anechoic Chamber
Date June 11, 2014 June 12, 2014
Temperature / Humidity 26 deg.C, 64 %RH 24 deg.C, 54 %RH
Engineer Shinichi Takano Shinichi Takano
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.	424.002	QP	33.1	16.5	7.2	31.7	25.1	46.0	20.9	195	315	
Hori.	728.004	QP	32.0	20.5	8.8	31.5	29.8	46.0	16.2	126	46	
Hori.	2390.000	PK	43.2	27.5	14.5	38.2	47.0	73.9	26.9	100	48	
Hori.	2558.013	PK	46.4	28.0	14.7	38.1	51.0	73.9	22.9	120	241	
Hori.	4804.000	PK	48.9	30.9	7.4	37.1	50.1	73.9	23.8	100	227	
Hori.	7206.000	PK	44.9	36.6	8.8	39.4	50.9	73.9	23.0	100	0	
Hori.	9608.000	PK	43.5	39.1	9.6	37.6	54.6	73.9	19.3	100	0	
Hori.	12010.000	PK	44.7	39.9	10.9	38.5	57.0	73.9	16.9	100	0	
Hori.	2390.000	AV	30.8	27.5	14.5	38.2	34.6	53.9	19.3	100	48	
Hori.	2558.013	AV	37.9	28.0	14.7	38.1	42.5	53.9	11.4	120	241	
Hori.	4804.000	AV	41.3	30.9	7.4	37.1	42.5	53.9	11.4	100	227	
Hori.	7206.000	AV	33.5	36.6	8.8	39.4	39.5	53.9	14.4	100	0	
Hori.	9608.000	AV	31.8	39.1	9.6	37.6	42.9	53.9	11.0	100	0	
Hori.	12010.000	AV	33.5	39.9	10.9	38.5	45.8	53.9	8.1	100	0	
Vert.	52.000	QP	22.4	10.0	7.2	31.9	7.7	40.0	32.3	100	0	
Vert.	548.001	QP	30.5	18.1	8.0	31.7	24.9	46.0	21.1	100	213	
Vert.	728.005	QP	33.2	20.5	8.8	31.5	31.0	46.0	15.0	100	268	
Vert.	2390.000	PK	42.9	27.5	14.5	38.2	46.7	73.9	27.2	100	317	
Vert.	2558.027	PK	47.6	28.0	14.7	38.1	52.2	73.9	21.7	100	306	
Vert.	4804.000	PK	48.3	30.9	7.4	37.1	49.5	73.9	24.4	100	259	
Vert.	7206.000	PK	45.2	36.6	8.8	39.4	51.2	73.9	22.7	100	0	
Vert.	9608.000	PK	43.9	39.1	9.6	37.6	55.0	73.9	18.9	100	0	
Vert.	12010.000	PK	44.3	39.9	10.9	38.5	56.6	73.9	17.3	100	0	
Vert.	2390.000	AV	31.3	27.5	14.5	38.2	35.1	53.9	18.8	100	317	
Vert.	2558.027	AV	40.2	28.0	14.7	38.1	44.8	53.9	9.1	100	306	
Vert.	4804.000	AV	40.5	30.9	7.4	37.1	41.7	53.9	12.2	100	259	
Vert.	7206.000	AV	33.4	36.6	8.8	39.4	39.4	53.9	14.5	100	0	
Vert.	9608.000	AV	31.7	39.1	9.6	37.6	42.8	53.9	11.1	100	0	
Vert.	12010.000	AV	33.4	39.9	10.9	38.5	45.7	53.9	8.2	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-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	95.1	27.5	14.5	38.2	98.9	-	-	
Hori.	2400.000	PK	46.0	27.5	14.5	38.2	49.8	78.9	29.1	
Vert.	2402.000	PK	95.8	27.5	14.5	38.2	99.6	-	-	
Vert.	2400.000	PK	46.3	27.5	14.5	38.2	50.1	79.6	29.5	

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

Radiated Emission

Test place No.2 Semi Anechoic Chamber
 Date June 11, 2014 June 12, 2014
 Temperature / Humidity 26 deg.C, 64 %RH 24 deg.C, 54 %RH
 Engineer Shinichi Takano Shinichi Takano
 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.	423.999	QP	33.4	16.5	7.2	31.7	25.4	46.0	20.6	193	314	
Hori.	728.002	QP	31.1	20.5	8.8	31.5	28.9	46.0	17.1	122	39	
Hori.	2597.007	PK	45.2	28.0	14.8	38.1	49.9	73.9	24.0	100	241	
Hori.	4882.000	PK	48.5	31.4	7.5	37.0	50.4	73.9	23.5	100	235	
Hori.	7323.000	PK	43.7	36.7	8.7	39.4	49.7	73.9	24.2	100	0	
Hori.	9764.000	PK	42.5	39.0	9.8	37.5	53.8	73.9	20.1	100	0	
Hori.	12205.000	PK	43.7	39.9	10.9	38.3	56.2	73.9	17.7	100	0	
Hori.	2597.007	AV	36.1	28.0	14.8	38.1	40.8	53.9	13.1	100	241	
Hori.	4882.000	AV	41.5	31.4	7.5	37.0	43.4	53.9	10.5	100	235	
Hori.	7323.000	AV	32.9	36.7	8.7	39.4	38.9	53.9	15.0	100	0	
Hori.	9764.000	AV	30.7	39.0	9.8	37.5	42.0	53.9	11.9	100	0	
Hori.	12205.000	AV	32.0	39.9	10.9	38.3	44.5	53.9	9.4	100	0	
Vert.	52.000	QP	23.2	10.0	7.2	31.9	8.5	40.0	31.5	100	0	
Vert.	548.007	QP	30.2	18.1	8.0	31.7	24.6	46.0	21.4	100	210	
Vert.	728.001	QP	34.1	20.5	8.8	31.5	31.9	46.0	14.1	100	272	
Vert.	2597.005	PK	47.0	28.0	14.8	38.1	51.7	73.9	22.2	100	136	
Vert.	4882.000	PK	46.6	31.4	7.5	37.0	48.5	73.9	25.4	100	260	
Vert.	7323.000	PK	44.2	36.7	8.7	39.4	50.2	73.9	23.7	100	0	
Vert.	9764.000	PK	43.4	39.0	9.8	37.5	54.7	73.9	19.2	100	0	
Vert.	12205.000	PK	44.0	39.9	10.9	38.3	56.5	73.9	17.4	100	0	
Vert.	2597.005	AV	39.1	28.0	14.8	38.1	43.8	53.9	10.1	100	136	
Vert.	4882.000	AV	38.3	31.4	7.5	37.0	40.2	53.9	13.7	100	260	
Vert.	7323.000	AV	33.2	36.7	8.7	39.4	39.2	53.9	14.7	100	0	
Vert.	9764.000	AV	31.3	39.0	9.8	37.5	42.6	53.9	11.3	100	0	
Vert.	12205.000	AV	32.2	39.9	10.9	38.3	44.7	53.9	9.2	100	0	

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

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$ **UL Japan, Inc.****Shonan EMC Lab.**

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Radiated Emission

Test place No.2 Semi Anechoic Chamber
 Date June 11, 2014 June 12, 2014
 Temperature / Humidity 26 deg.C, 64 %RH 24 deg.C, 54 %RH
 Engineer Shinichi Takano Shinichi Takano
 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.	424.000	QP	33.0	16.5	7.2	31.7	25.0	46.0	21.0	203	308	
Hori.	728.005	QP	32.2	20.5	8.8	31.5	30.0	46.0	16.0	132	52	
Hori.	2324.036	PK	45.9	27.2	14.5	38.3	49.3	73.9	24.6	100	44	
Hori.	2483.500	PK	44.8	27.8	14.6	38.1	49.1	73.9	24.8	100	45	
Hori.	2636.019	PK	45.9	28.1	14.8	38.1	50.7	73.9	23.2	100	242	
Hori.	4960.000	PK	47.5	31.8	7.6	37.0	49.9	73.9	24.0	100	231	
Hori.	7440.000	PK	43.7	36.8	8.8	39.4	49.9	73.9	24.0	100	0	
Hori.	9920.000	PK	41.7	38.9	9.9	37.5	53.0	73.9	20.9	100	0	
Hori.	12400.000	PK	42.5	40.0	11.0	38.2	55.3	73.9	18.6	100	0	
Hori.	2324.036	AV	37.4	27.2	14.5	38.3	40.8	53.9	13.1	100	44	
Hori.	2483.500	AV	33.0	27.8	14.6	38.1	37.3	53.9	16.6	100	45	
Hori.	2636.019	AV	36.2	28.1	14.8	38.1	41.0	53.9	12.9	100	242	
Hori.	4960.000	AV	39.8	31.8	7.6	37.0	42.2	53.9	11.7	100	231	
Hori.	7440.000	AV	32.3	36.8	8.8	39.4	38.5	53.9	15.4	100	0	
Hori.	9920.000	AV	30.0	38.9	9.9	37.5	41.3	53.9	12.6	100	0	
Hori.	12400.000	AV	30.8	40.0	11.0	38.2	43.6	53.9	10.3	100	0	
Vert.	52.000	QP	22.4	10.0	7.2	31.9	7.7	40.0	32.3	100	0	
Vert.	547.997	QP	30.6	18.1	8.0	31.7	25.0	46.0	21.0	100	218	
Vert.	727.994	QP	34.4	20.5	8.8	31.5	32.2	46.0	13.8	100	266	
Vert.	2324.007	PK	46.8	27.2	14.5	38.3	50.2	73.9	23.7	100	313	
Vert.	2483.500	PK	45.0	27.8	14.6	38.1	49.3	73.9	24.6	100	304	
Vert.	2635.999	PK	45.2	28.1	14.8	38.1	50.0	73.9	23.9	100	272	
Vert.	4960.000	PK	47.3	31.8	7.6	37.0	49.7	73.9	24.2	100	153	
Vert.	7440.000	PK	43.7	36.8	8.8	39.4	49.9	73.9	24.0	100	0	
Vert.	9920.000	PK	41.3	38.9	9.9	37.5	52.6	73.9	21.3	100	0	
Vert.	12400.000	PK	41.7	40.0	11.0	38.2	54.5	73.9	19.4	100	0	
Vert.	2324.007	AV	38.2	27.2	14.5	38.3	41.6	53.9	12.3	100	313	
Vert.	2483.500	AV	33.3	27.8	14.6	38.1	37.6	53.9	16.3	100	304	
Vert.	2635.999	AV	35.8	28.1	14.8	38.1	40.6	53.9	13.3	100	272	
Vert.	4960.000	AV	39.7	31.8	7.6	37.0	42.1	53.9	11.8	100	153	
Vert.	7440.000	AV	32.4	36.8	8.8	39.4	38.6	53.9	15.3	100	0	
Vert.	9920.000	AV	30.1	38.9	9.9	37.5	41.4	53.9	12.5	100	0	
Vert.	12400.000	AV	30.8	40.0	11.0	38.2	43.6	53.9	10.3	100	0	

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

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

UL Japan, Inc.

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Radiated Emission

Test place No.2 Semi Anechoic Chamber
Date June 11, 2014 June 12, 2014
Temperature / Humidity 26 deg.C, 64 %RH 24 deg.C, 54 %RH
Engineer Shinichi Takano Shinichi Takano
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.	424.004	QP	32.9	16.5	7.2	31.7	24.9	46.0	21.1	192	317	
Hori.	727.991	QP	33.9	20.5	8.8	31.5	31.7	46.0	14.3	133	37	
Hori.	2390.000	PK	43.4	27.5	14.5	38.2	47.2	73.9	26.7	100	45	
Hori.	2532.042	PK	45.9	28.0	14.7	38.1	50.5	73.9	23.4	100	43	
Hori.	4804.000	PK	48.1	30.9	7.4	37.1	49.3	73.9	24.6	100	242	
Hori.	7206.000	PK	45.2	36.6	8.8	39.4	51.2	73.9	22.7	100	0	
Hori.	9608.000	PK	43.7	39.1	9.6	37.6	54.8	73.9	19.1	100	0	
Hori.	12010.000	PK	44.2	39.9	10.9	38.5	56.5	73.9	17.4	100	0	
Hori.	2390.000	AV	32.0	27.5	14.5	38.2	35.8	53.9	18.1	100	45	
Hori.	2532.042	AV	34.6	28.0	14.7	38.1	39.2	53.9	14.7	100	43	
Hori.	4804.000	AV	38.4	30.9	7.4	37.1	39.6	53.9	14.3	100	242	
Hori.	7206.000	AV	33.6	36.6	8.8	39.4	39.6	53.9	14.3	100	0	
Hori.	9608.000	AV	31.9	39.1	9.6	37.6	43.0	53.9	10.9	100	0	
Hori.	12010.000	AV	33.4	39.9	10.9	38.5	45.7	53.9	8.2	100	0	
Vert.	52.000	QP	22.4	10.0	7.2	31.9	7.7	40.0	32.3	100	0	
Vert.	548.009	QP	30.8	18.1	8.0	31.7	25.2	46.0	20.8	100	214	
Vert.	728.006	QP	33.3	20.5	8.8	31.5	31.1	46.0	14.9	100	248	
Vert.	2390.000	PK	43.3	27.5	14.5	38.2	47.1	73.9	26.8	100	314	
Vert.	2558.016	PK	47.4	28.0	14.7	38.1	52.0	73.9	21.9	100	303	
Vert.	4804.000	PK	47.8	30.9	7.4	37.1	49.0	73.9	24.9	100	260	
Vert.	7206.000	PK	44.7	36.6	8.8	39.4	50.7	73.9	23.2	100	0	
Vert.	9608.000	PK	42.6	39.1	9.6	37.6	53.7	73.9	20.2	100	0	
Vert.	12010.000	PK	44.8	39.9	10.9	38.5	57.1	73.9	16.8	100	0	
Vert.	2390.000	AV	32.1	27.5	14.5	38.2	35.9	53.9	18.0	100	314	
Vert.	2558.016	AV	38.4	28.0	14.7	38.1	43.0	53.9	10.9	100	303	
Vert.	4804.000	AV	38.4	30.9	7.4	37.1	39.6	53.9	14.3	100	260	
Vert.	7206.000	AV	33.5	36.6	8.8	39.4	39.5	53.9	14.4	100	0	
Vert.	9608.000	AV	31.7	39.1	9.6	37.6	42.8	53.9	11.1	100	0	
Vert.	12010.000	AV	33.3	39.9	10.9	38.5	45.6	53.9	8.3	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-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	96.4	27.5	14.5	38.2	100.2	-	-	
Hori.	2400.000	PK	49.1	27.5	14.5	38.2	52.9	80.2	27.3	
Vert.	2402.000	PK	97.1	27.5	14.5	38.2	100.9	-	-	
Vert.	2400.000	PK	49.8	27.5	14.5	38.2	53.6	80.9	27.3	

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

Radiated Emission

Test place No.2 Semi Anechoic Chamber
 Date June 11, 2014 June 12, 2014
 Temperature / Humidity 26 deg.C, 64 %RH 24 deg.C, 54 %RH
 Engineer Shinichi Takano Shinichi Takano
 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.	424.001	QP	33.0	16.5	7.2	31.7	25.0	46.0	21.0	201	315	
Hori.	728.009	QP	34.0	20.5	8.8	31.5	31.8	46.0	14.2	137	42	
Hori.	2596.976	PK	45.3	28.0	14.8	38.1	50.0	73.9	23.9	100	242	
Hori.	4882.000	PK	48.2	31.4	7.5	37.0	50.1	73.9	23.8	100	235	
Hori.	7323.000	PK	44.7	36.7	8.7	39.4	50.7	73.9	23.2	100	0	
Hori.	9764.000	PK	42.9	39.0	9.8	37.5	54.2	73.9	19.7	100	0	
Hori.	12205.000	PK	43.3	39.9	10.9	38.3	55.8	73.9	18.1	100	0	
Hori.	2596.976	AV	35.0	28.0	14.8	38.1	39.7	53.9	14.2	100	242	
Hori.	4882.000	AV	38.1	31.4	7.5	37.0	40.0	53.9	13.9	100	235	
Hori.	7323.000	AV	33.0	36.7	8.7	39.4	39.0	53.9	14.9	100	0	
Hori.	9764.000	AV	30.9	39.0	9.8	37.5	42.2	53.9	11.7	100	0	
Hori.	12205.000	AV	31.8	39.9	10.9	38.3	44.3	53.9	9.6	100	0	
Vert.	52.000	QP	22.3	10.0	7.2	31.9	7.6	40.0	32.4	100	0	
Vert.	547.999	QP	31.1	18.1	8.0	31.7	25.5	46.0	20.5	100	213	
Vert.	727.999	QP	33.7	20.5	8.8	31.5	31.5	46.0	14.5	100	264	
Vert.	2597.041	PK	45.1	28.0	14.8	38.1	49.8	73.9	24.1	100	158	
Vert.	4882.000	PK	47.5	31.4	7.5	37.0	49.4	73.9	24.5	100	151	
Vert.	7323.000	PK	44.4	36.7	8.7	39.4	50.4	73.9	23.5	100	0	
Vert.	9764.000	PK	42.3	39.0	9.8	37.5	53.6	73.9	20.3	100	0	
Vert.	12205.000	PK	43.0	39.9	10.9	38.3	55.5	73.9	18.4	100	0	
Vert.	2597.041	AV	35.7	28.0	14.8	38.1	40.4	53.9	13.5	100	158	
Vert.	4882.000	AV	38.0	31.4	7.5	37.0	39.9	53.9	14.0	100	151	
Vert.	7323.000	AV	33.0	36.7	8.7	39.4	39.0	53.9	14.9	100	0	
Vert.	9764.000	AV	31.0	39.0	9.8	37.5	42.3	53.9	11.6	100	0	
Vert.	12205.000	AV	31.8	39.9	10.9	38.3	44.3	53.9	9.6	100	0	

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

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$ **UL Japan, Inc.****Shonan EMC Lab.**

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Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

Test place No.2 Semi Anechoic Chamber
 Date June 11, 2014 June 12, 2014
 Temperature / Humidity 26 deg.C, 64 %RH 24 deg.C, 54 %RH
 Engineer Shinichi Takano Shinichi Takano
 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.	423.999	QP	33.1	16.5	7.2	31.7	25.1	46.0	20.9	203	314	
Hori.	728.001	QP	32.5	20.5	8.8	31.5	30.3	46.0	15.7	132	42	
Hori.	2324.804	PK	45.5	27.2	14.5	38.3	48.9	73.9	25.0	148	41	
Hori.	2483.500	PK	47.7	27.8	14.6	38.1	52.0	73.9	21.9	100	44	
Hori.	4960.000	PK	46.8	31.8	7.6	37.0	49.2	73.9	24.7	100	234	
Hori.	7440.000	PK	43.8	36.8	8.8	39.4	50.0	73.9	23.9	100	0	
Hori.	9920.000	PK	42.1	38.9	9.9	37.5	53.4	73.9	20.5	100	0	
Hori.	12400.000	PK	41.6	40.0	11.0	38.2	54.4	73.9	19.5	100	0	
Hori.	2324.804	AV	36.2	27.2	14.5	38.3	39.6	53.9	14.3	148	41	
Hori.	2483.500	AV	33.7	27.8	14.6	38.1	38.0	53.9	15.9	100	44	
Hori.	4960.000	AV	37.0	31.8	7.6	37.0	39.4	53.9	14.5	100	234	
Hori.	7440.000	AV	32.4	36.8	8.8	39.4	38.6	53.9	15.3	100	0	
Hori.	9920.000	AV	30.2	38.9	9.9	37.5	41.5	53.9	12.4	100	0	
Hori.	12400.000	AV	30.8	40.0	11.0	38.2	43.6	53.9	10.3	100	0	
Vert.	52.000	QP	22.4	10.0	7.2	31.9	7.7	40.0	32.3	100	0	
Vert.	548.009	QP	30.9	18.1	8.0	31.7	25.3	46.0	20.7	100	225	
Vert.	728.009	QP	33.6	20.5	8.8	31.5	31.4	46.0	14.6	100	266	
Vert.	2324.003	PK	46.5	27.2	14.5	38.3	49.9	73.9	24.0	100	321	
Vert.	2483.500	PK	48.4	27.8	14.6	38.1	52.7	73.9	21.2	100	307	
Vert.	2635.970	PK	45.5	28.1	14.8	38.1	50.3	73.9	23.6	100	168	
Vert.	4960.000	PK	45.3	31.8	7.6	37.0	47.7	73.9	26.2	100	163	
Vert.	7440.000	PK	43.8	36.8	8.8	39.4	50.0	73.9	23.9	100	0	
Vert.	9920.000	PK	41.6	38.9	9.9	37.5	52.9	73.9	21.0	100	0	
Vert.	12400.000	PK	42.5	40.0	11.0	38.2	55.3	73.9	18.6	100	0	
Vert.	2324.003	AV	37.0	27.2	14.5	38.3	40.4	53.9	13.5	100	321	
Vert.	2483.500	AV	34.4	27.8	14.6	38.1	38.7	53.9	15.2	100	307	
Vert.	2635.970	AV	35.3	28.1	14.8	38.1	40.1	53.9	13.8	100	168	
Vert.	4960.000	AV	35.5	31.8	7.6	37.0	37.9	53.9	16.0	100	163	
Vert.	7440.000	AV	32.3	36.8	8.8	39.4	38.5	53.9	15.4	100	0	
Vert.	9920.000	AV	30.1	38.9	9.9	37.5	41.4	53.9	12.5	100	0	
Vert.	12400.000	AV	30.8	40.0	11.0	38.2	43.6	53.9	10.3	100	0	

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

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

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Test place

UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

25 deg.C , 67 %RH

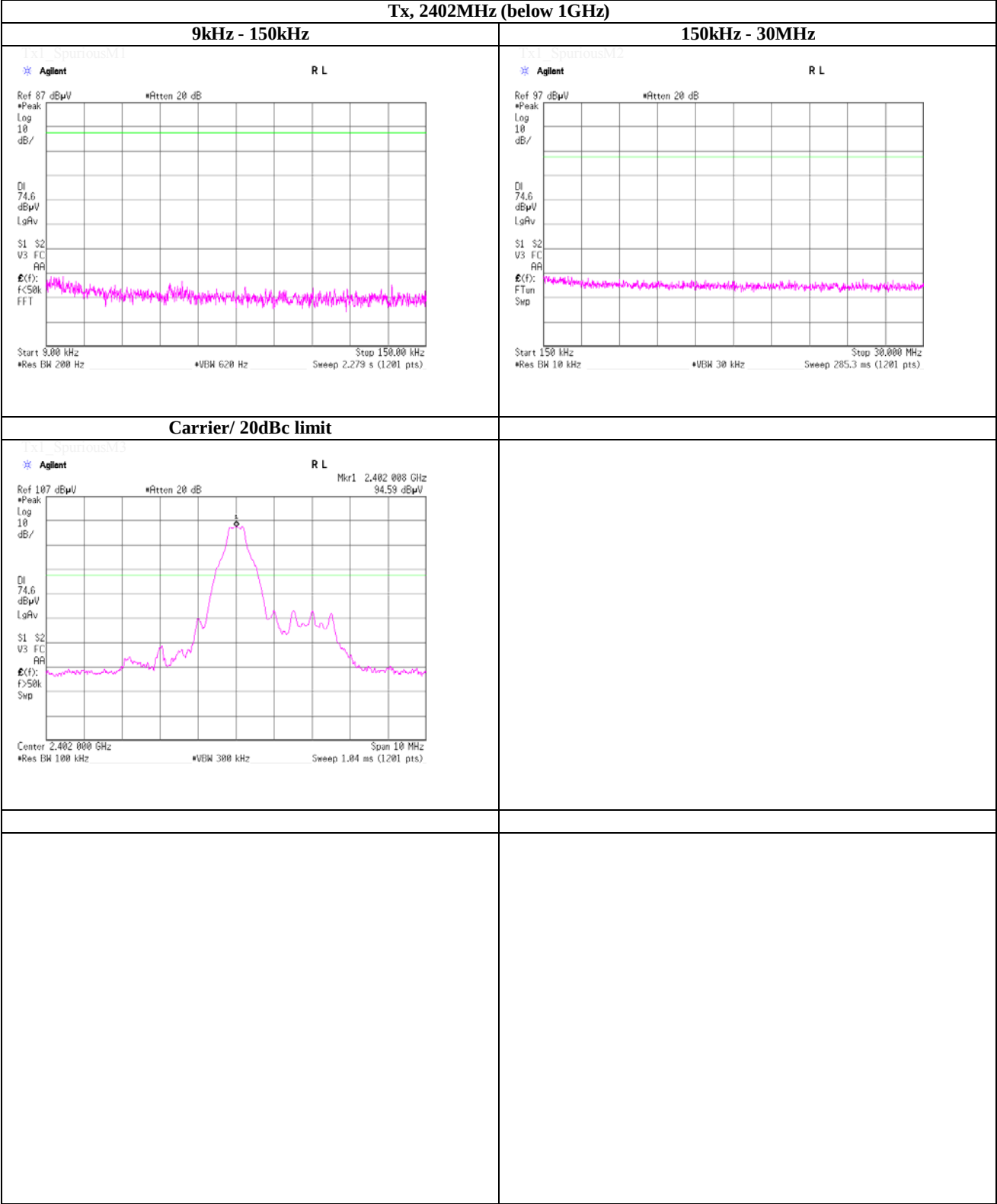
Engineer

Hikaru Shirasawa

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (below 1GHz)



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Test place

UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

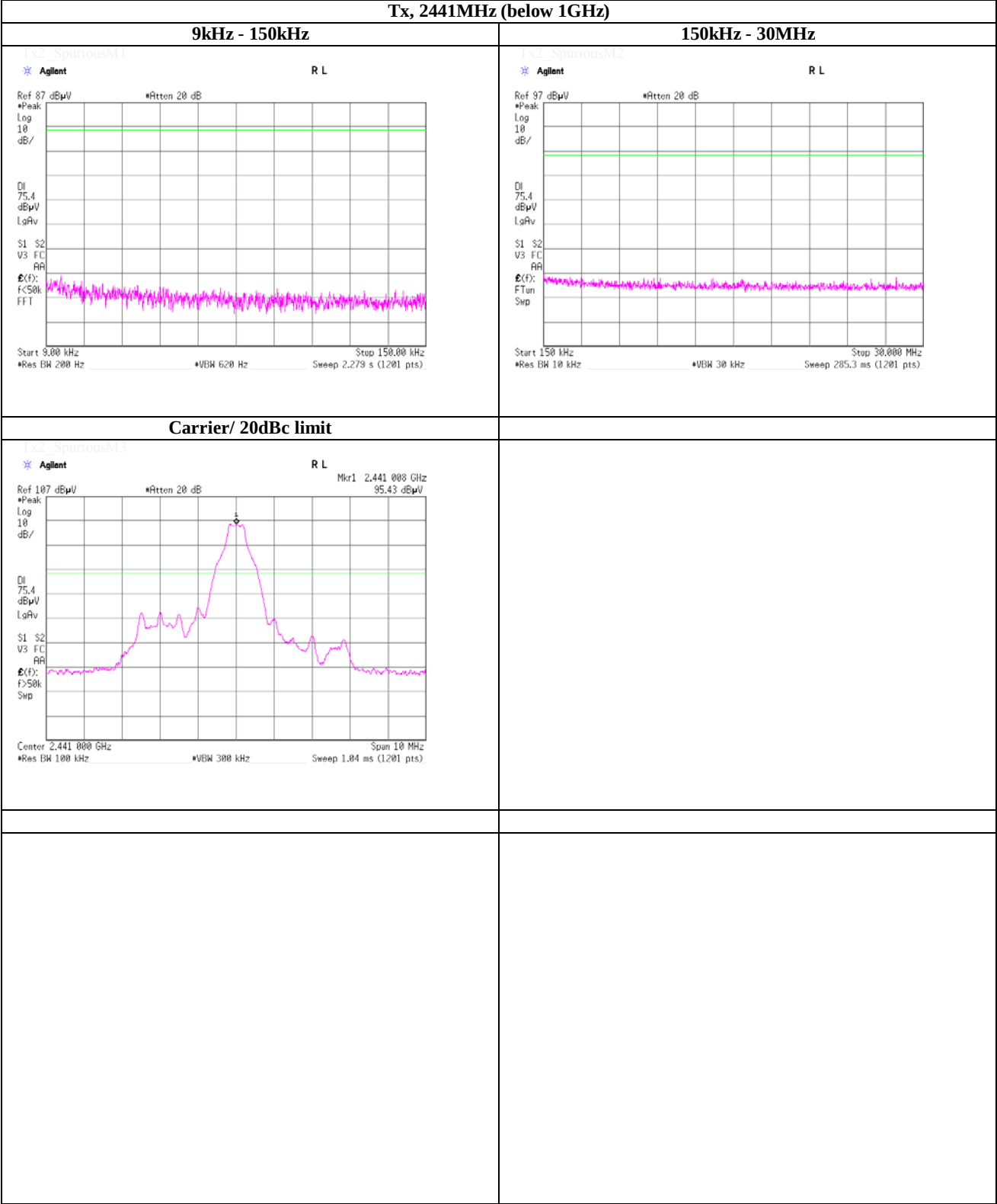
25 deg.C , 67 %RH

Engineer

Hikaru Shirasawa

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9
Tx, 2441MHz (below 1GHz)



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Test place

UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

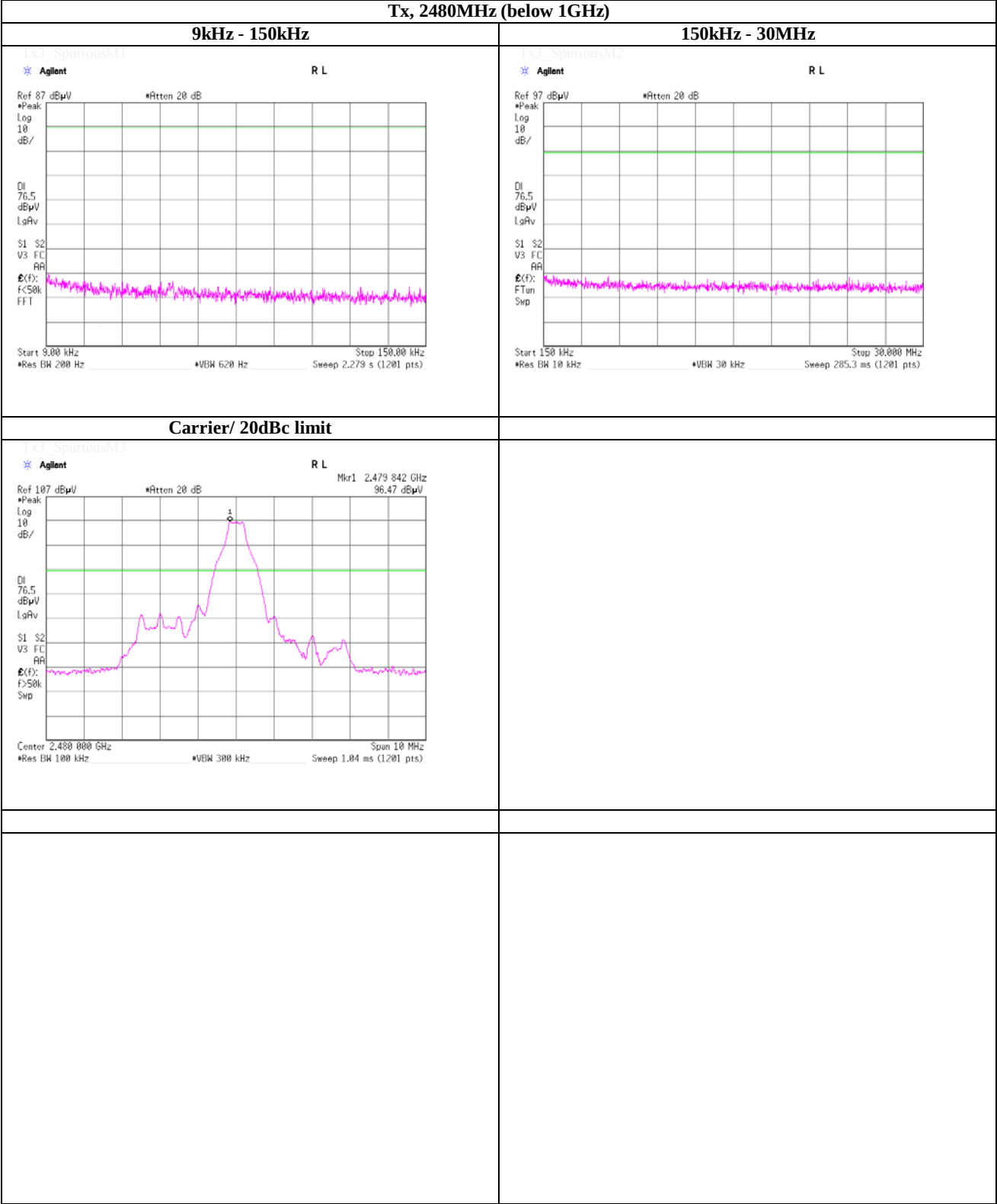
25 deg.C , 67 %RH

Engineer

Hikaru Shirasawa

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9
Tx, 2480MHz (below 1GHz)



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Test place

UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

25 deg.C , 67 %RH

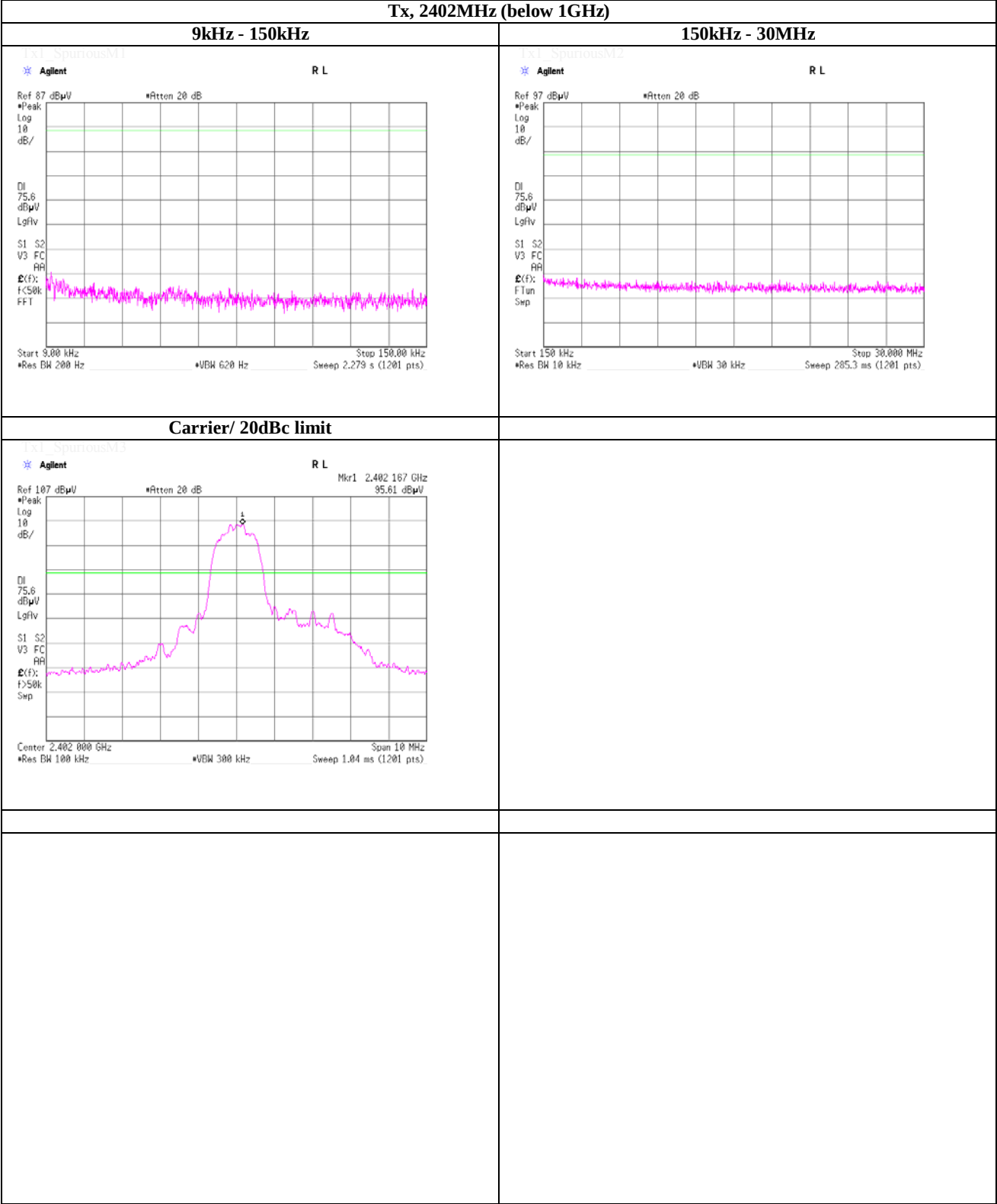
Engineer

Hikaru Shirasawa

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (below 1GHz)



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Test place

UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

25 deg.C , 67 %RH

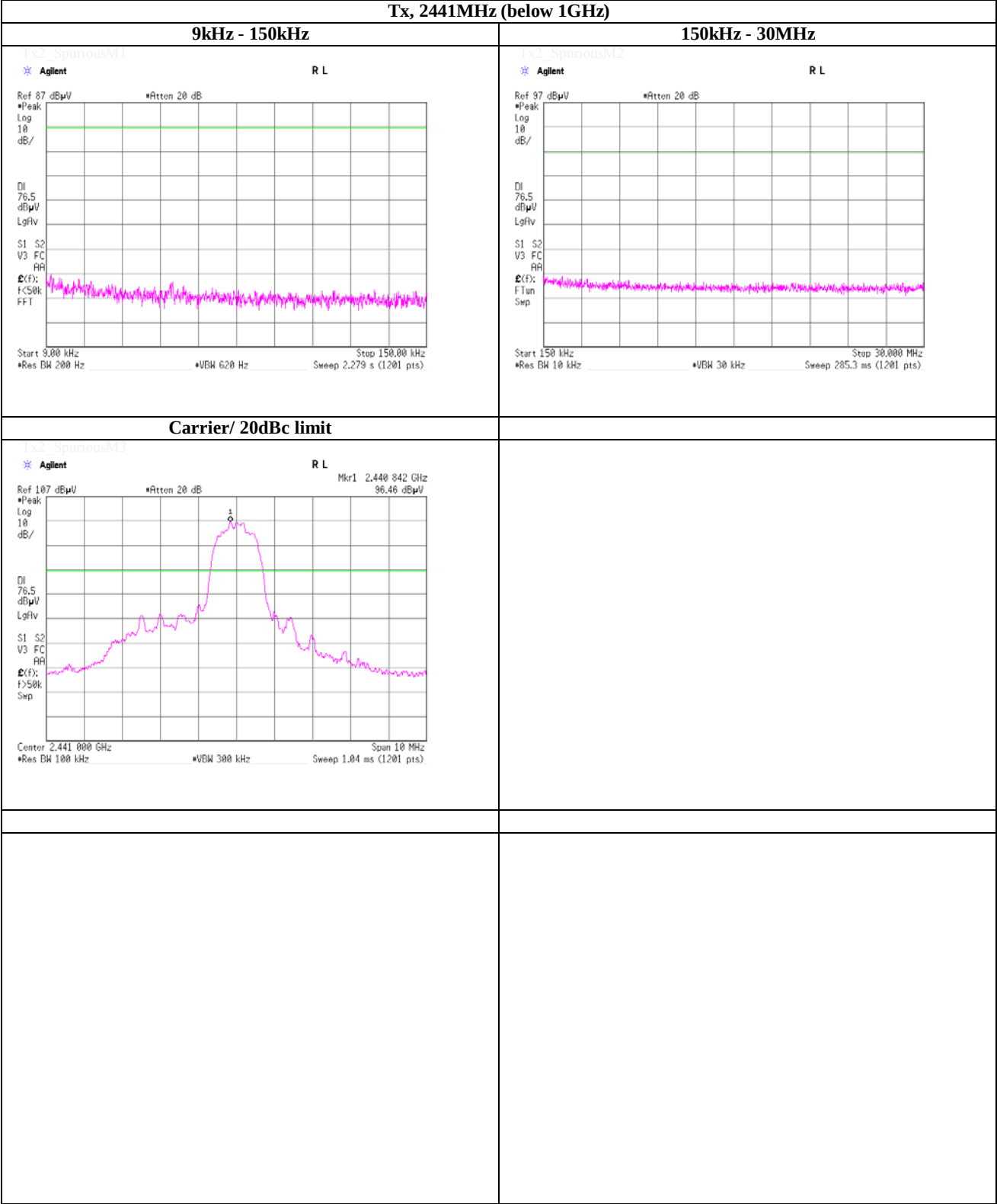
Engineer

Hikaru Shirasawa

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (below 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

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Telephone : +81 463 50 6400

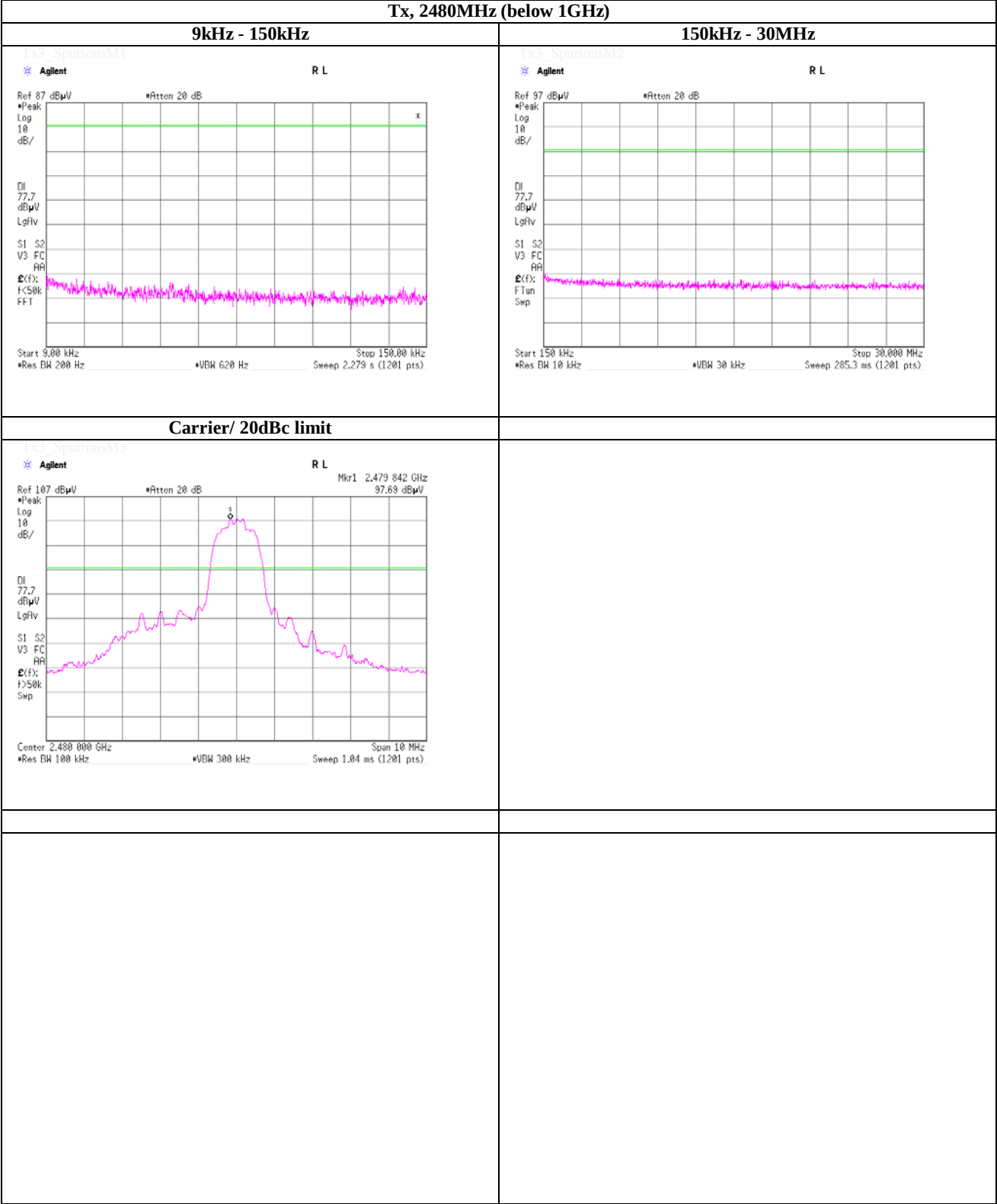
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date June 6, 2014
Temperature / Humidity 25 deg.C , 67 %RH
Engineer Hikaru Shirasawa

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 1GHz)



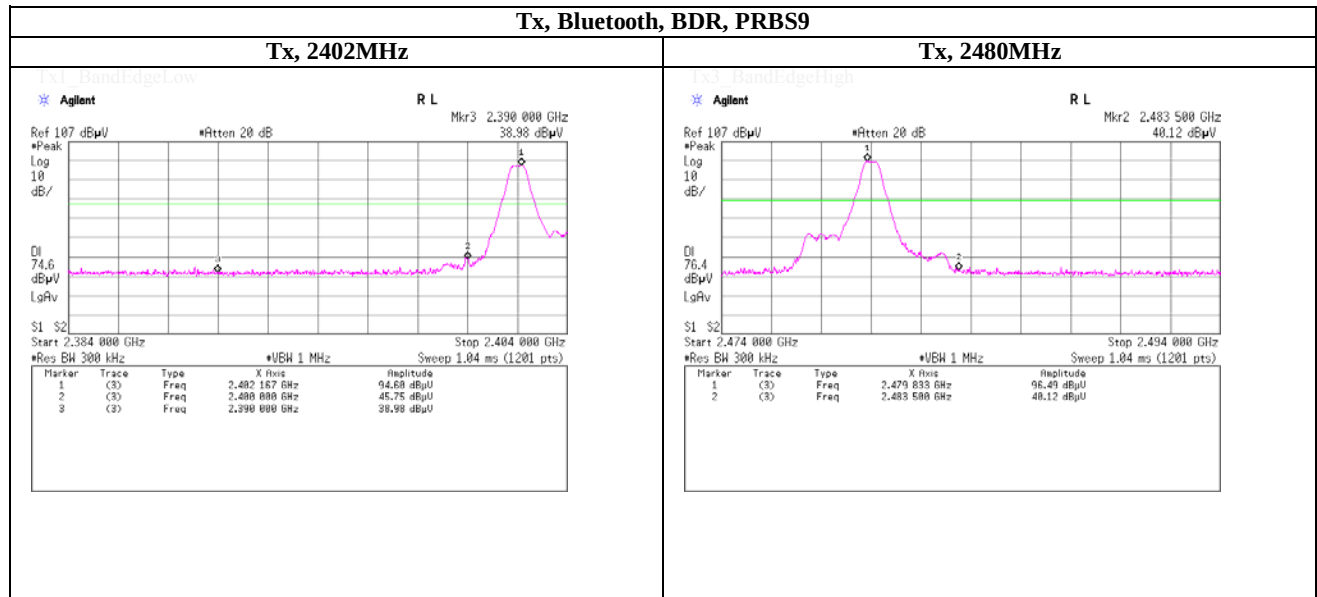
UL Japan, Inc.
Shonan EMC Lab.
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Telephone : +81 463 50 6400
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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date June 6, 2014
Temperature / Humidity 25 deg.C , 67 %RH
Engineer Hikaru Shirasawa

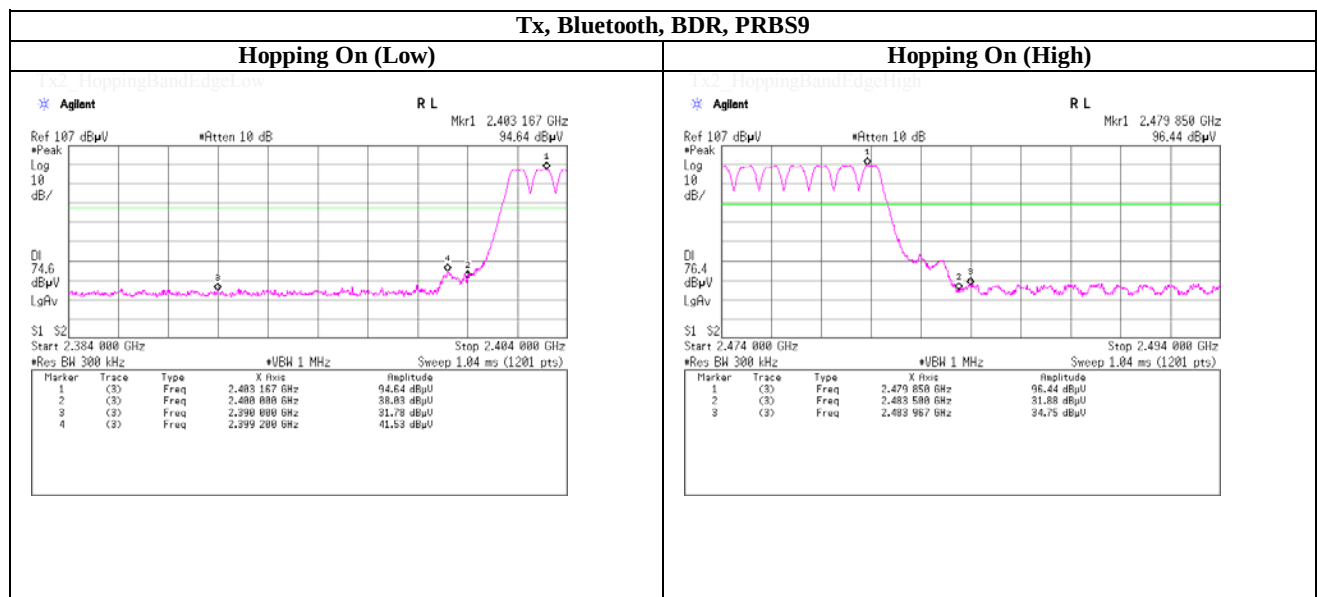
Spurious emission (Conducted)

Band Edge compliance

Tx, Bluetooth, BDR, PRBS9



Tx, Bluetooth, BDR, PRBS9



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Test place

UL Japan, Inc. Shonan EMC Lab.

No.1 Measurement Room

Date

June 6, 2014

Temperature / Humidity

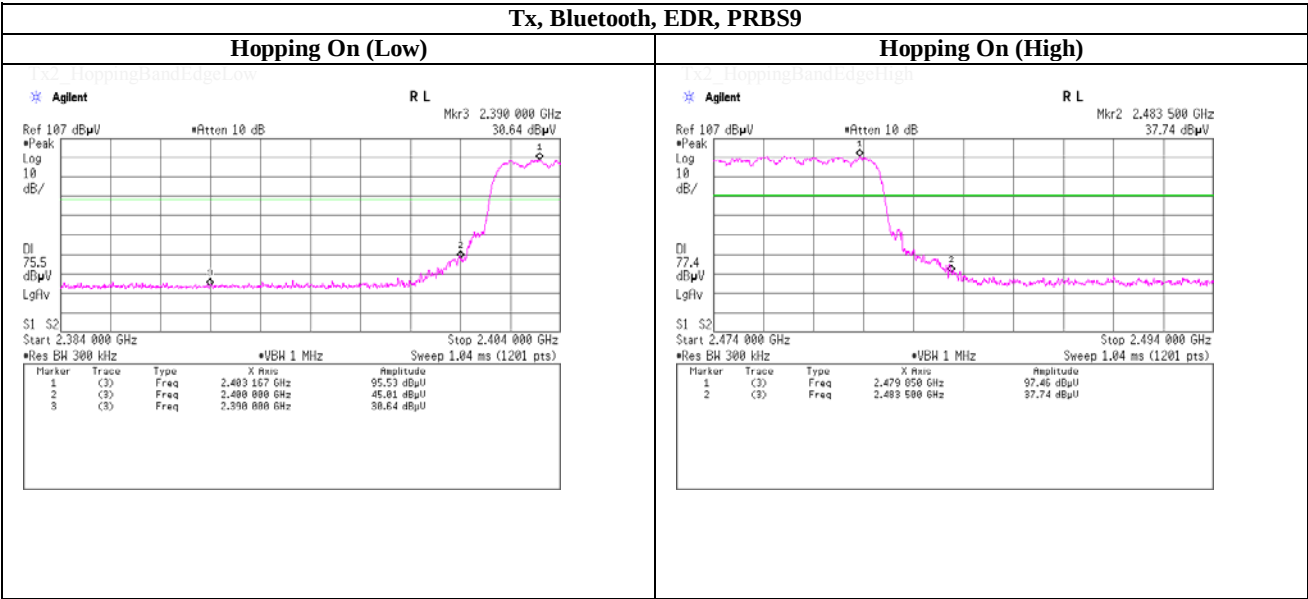
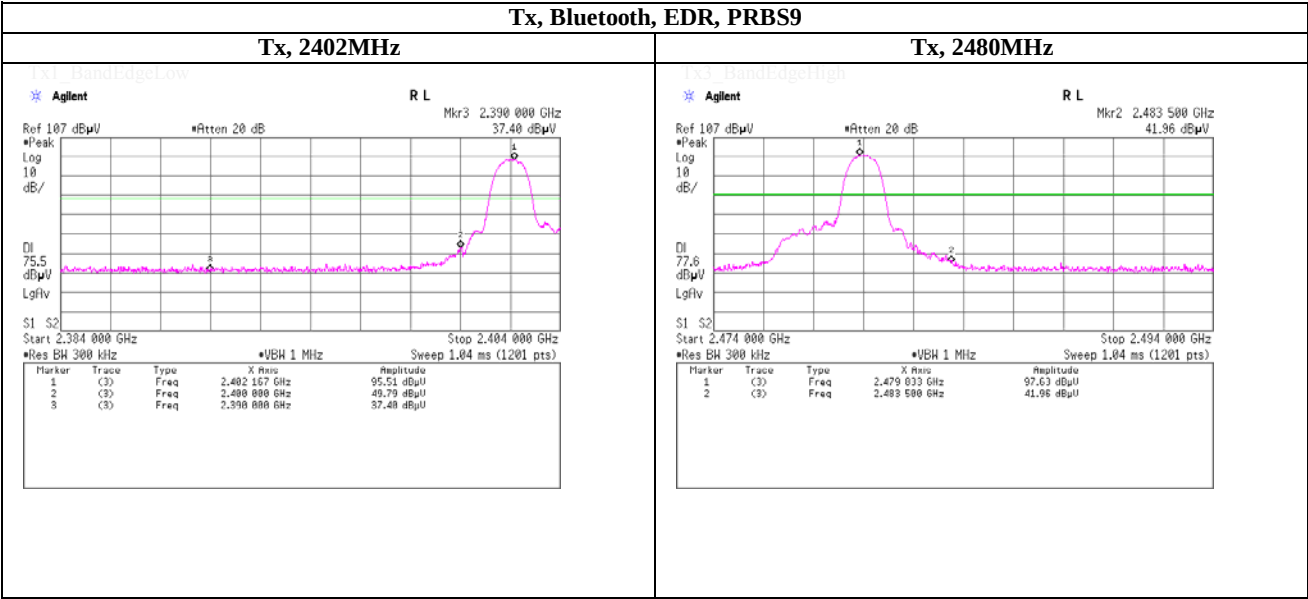
25 deg.C , 67 %RH

Engineer

Hikaru Shirasawa

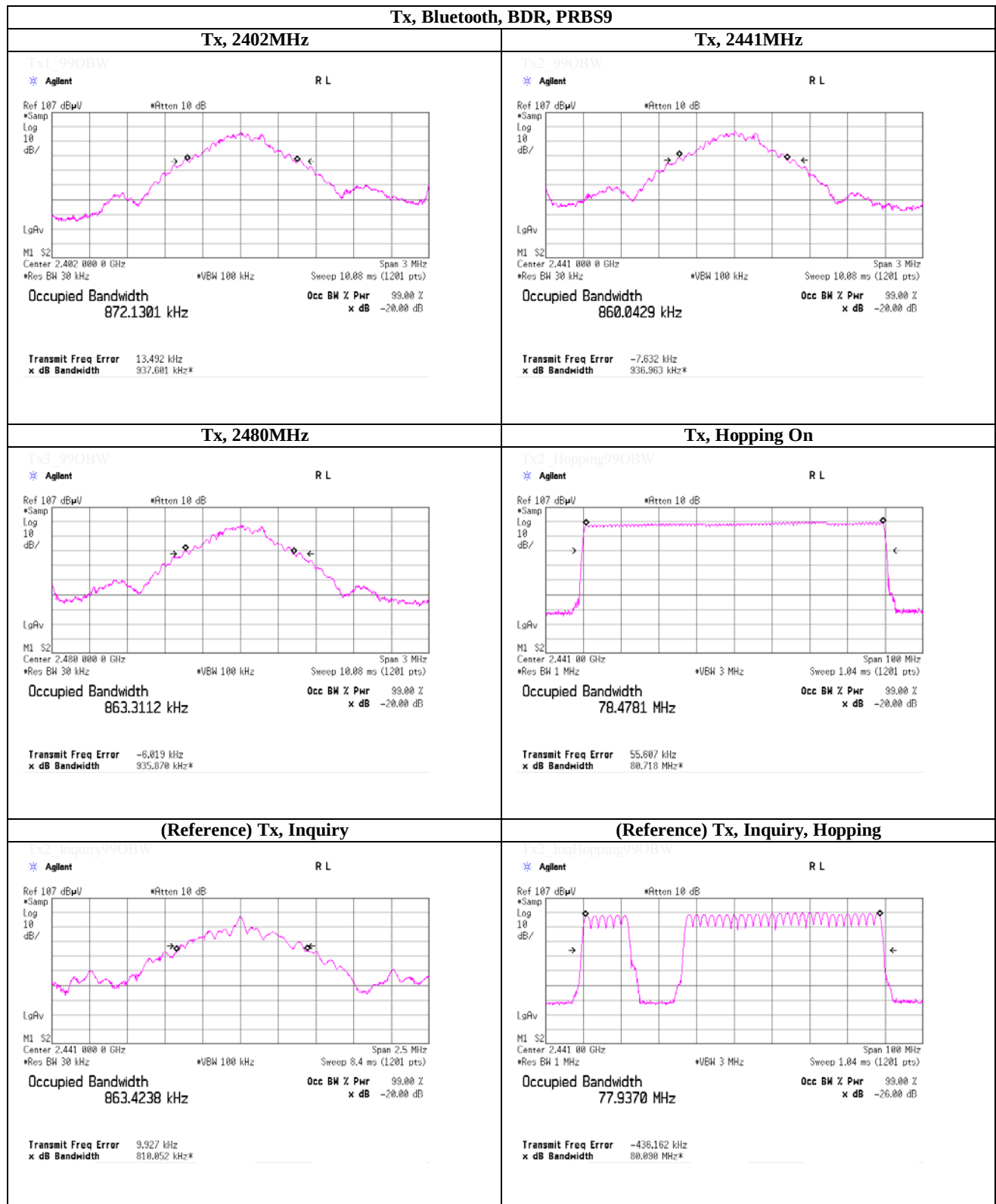
Spurious emission (Conducted)

Band Edge compliance



Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date June 6, 2014
 Temperature / Humidity 25 deg.C , 67 %RH
 Engineer Hikaru Shirasawa

99% Occupied Bandwidth



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Test place

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Date

June 6, 2014

Temperature / Humidity

25 deg.C , 67 %RH

Engineer

Hikaru Shirasawa

99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
Tx, 2402MHz	Tx, 2441MHz
Tx1_99OBW Agilent RL Ref 107 dBμV •Samp Log 10 dB/ •Atten 10 dB Lgflv M1 S2 Center 2.402 000 0 GHz •Res BW 30 kHz •VBW 100 kHz Sweep 10.08 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1546 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error 10.544 kHz x dB Bandwidth 1.257 MHz*	Tx2_99OBW Agilent RL Ref 107 dBμV •Samp Log 10 dB/ •Atten 10 dB Lgflv M1 S2 Center 2.441 000 0 GHz •Res BW 30 kHz •VBW 100 kHz Sweep 10.08 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1516 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -683.955 Hz x dB Bandwidth 1.251 MHz*
Tx, 2480MHz	Tx, Hopping On
Tx3_99OBW Agilent RL Ref 107 dBμV •Samp Log 10 dB/ •Atten 10 dB Lgflv M1 S2 Center 2.480 000 0 GHz •Res BW 30 kHz •VBW 100 kHz Sweep 10.08 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1523 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error 276.211 Hz x dB Bandwidth 1.252 MHz*	Tx2_Hopping99OBW Agilent RL Ref 107 dBμV •Samp Log 10 dB/ •Atten 10 dB Lgflv M1 S2 Center 2.441 00 GHz •Res BW 1 MHz •VBW 3 MHz Sweep 1.04 ms (1201 pts) Span 100 MHz Occupied Bandwidth 78.6615 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error 94.388 kHz x dB Bandwidth 80.991 MHz*
Tx2_Inquiry99OBW Agilent RL Ref 107 dBμV •Samp Log 10 dB/ •Atten 10 dB Lgflv M1 S2 Center 2.480 000 0 GHz •Res BW 30 kHz •VBW 100 kHz Sweep 10.08 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1523 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error 276.211 Hz x dB Bandwidth 1.252 MHz*	Tx2_InqHopping99OBW Agilent RL Ref 107 dBμV •Samp Log 10 dB/ •Atten 10 dB Lgflv M1 S2 Center 2.441 00 GHz •Res BW 1 MHz •VBW 3 MHz Sweep 1.04 ms (1201 pts) Span 100 MHz Occupied Bandwidth 78.6615 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error 94.388 kHz x dB Bandwidth 80.991 MHz*

APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2014/03/04 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2014/04/08 * 12
SPSS-01	Power Sensor	Anritsu	MA2444D	0738366	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-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2014/04/22 * 12
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2013/07/06 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2013/11/22 * 12
SCC-G02	Coaxial Cable	Suhner	SUCOFLEX 104A	46498/4A	RE	2014/04/22 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2014/05/15 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2013/08/12 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2014/02/21 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2014/03/17 * 12
SJM-14	Measure	ASKUL	-	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE	-
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2013/11/22 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2014/04/22 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2014/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2014/03/14 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2014/03/13 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2014/02/17 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2013/08/19 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2013/11/24 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2014/04/25 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2014/04/25 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2013/11/24 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE	2014/02/18 * 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