



# RADIO TEST REPORT

**Test Report No.: 32DE0050-SH-01-A**

**Applicant** : **Sony Corporation**  
**Type of Equipment** : **AV CENTER**  
**Model No.** : **XAV-64BT**  
**FCC ID** : **AK8XAV64BT**  
**Test regulation** : **FCC Part15 Subpart C: 2011**  
**Test result** : **Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

**Date of test:** November 22 to December 3, 2011

**Representative  
test engineer:**

Shinichi Takano  
Engineer of WiSE Japan,  
UL Verification Service

**Approved by :**

Go Ishiwata  
Manager of WiSE Japan,  
UL Verification Service

- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : Sony Corporation  
Brand Name : SONY  
Address : Shinagawa INTERCITY C Tower 2-15-3, Konan Minato-ku, Tokyo, 108-6201  
Japan  
Telephone Number : +81-3-5769-5640  
Facsimile Number : +81-3-5769-5996  
Contact Person : Kazunaga Kinjo

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

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

Type of Equipment : AV CENTER  
Model No. : XAV-64BT  
Serial No. : 6  
Rating : DC12V  
Country of Mass-production : Thailand  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No modification by the test lab.  
Receipt Date of Sample : November 21, 2011

### **2.2 Product description**

Model: XAV-64BT (referred to as the EUT in this report) is an AV CENTER.

Clock frequency(ies) in the system : 32.768kHz, 4MHz, 6MHz, 12MHz, 24MHz, 27MHz, 33MHz

Bluetooth specification:

Equipment type : Transceiver  
Frequency of operation : 2402-2480MHz  
Bandwidth & channel spacing : 79MHz & 1MHz  
Type of modulation : FHSS  
Antenna type : Surface mountable chip  
Antenna connector type : U.FL  
Antenna gain with cable loss : -4.2dBi  
ITU code : F1D, G1D  
Operation temperature range : -20 to +60 deg.C.

FCC Part15.31 (e)

The equipment provides the Bluetooth transmitter with stable power supply (DC 3.3 V), therefore, the equipment complies power supply regulation.

FCC Part15.203 Antenna requirement

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

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**SECTION 3: Test specification, procedures & results****3.1 Test specification**

Test specification : FCC Part 15 Subpart C: 2011,  
final revised on November 21, 2011 and effective December 21, 2011

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 revision on November 21, 2011 does not affect the test specification applied to the EUT.

The EUT has been tested for compliance with FCC Part 15 Subpart B: 2011. Refer to the test report 32DE0050-SH-01-B.

**3.2 Procedures & Results**

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	N/A	N/A
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2003 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 C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A		-
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2003 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 C63.4:2003 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 C63.4:2003 13. Measurement of intentional radiators	FCC 15.247 (d) 15.209	Conducted/ Radiated	N/A		4.1dB (4882MHz, AV, Vertical, Tx 2441MHz, DH5)

Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422  
\*1) The test is not applicable since the EUT does not have AC Mains.

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**3.3 Addition to standard**

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators, RSS-Gen 4.6.1	RSS-Gen 4.6.1	Conducted	-	-

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

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

**3.4 Uncertainty**

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

Item	Frequency range	No.1 SAC <sup>*1</sup> /SR <sup>*2</sup> (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
<b>Radiated emission (Measurement distance: 3m)</b>	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	5.0 dB
	300MHz-1GHz	5.0 dB	5.2 dB	5.0 dB
	1GHz-13GHz	4.8 dB	4.8 dB	4.9 dB
<b>Radiated emission (Measurement distance: 1m)</b>	13GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.8 dB	4.3 dB	4.4 dB

\*1: SAC=Semi-Anechoic Chamber

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

**Radiated emission test**

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

**Antenna port conducted test**

Power measurement uncertainty above 1GHz for this test was: (±) 1.9dB

Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.8dB

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

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.6dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 4.0dB

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 checked="" 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 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 Full-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**

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

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

However, the limit level 125mW of AFH mode was used for the test.

EUT has the power settings by the software as follows;

Power settings: BDR: Ext.=255, Int.=44

EDR: Ext.=255, Int.=48

Software: CSR BlueSuite BlueTest Version 1.24

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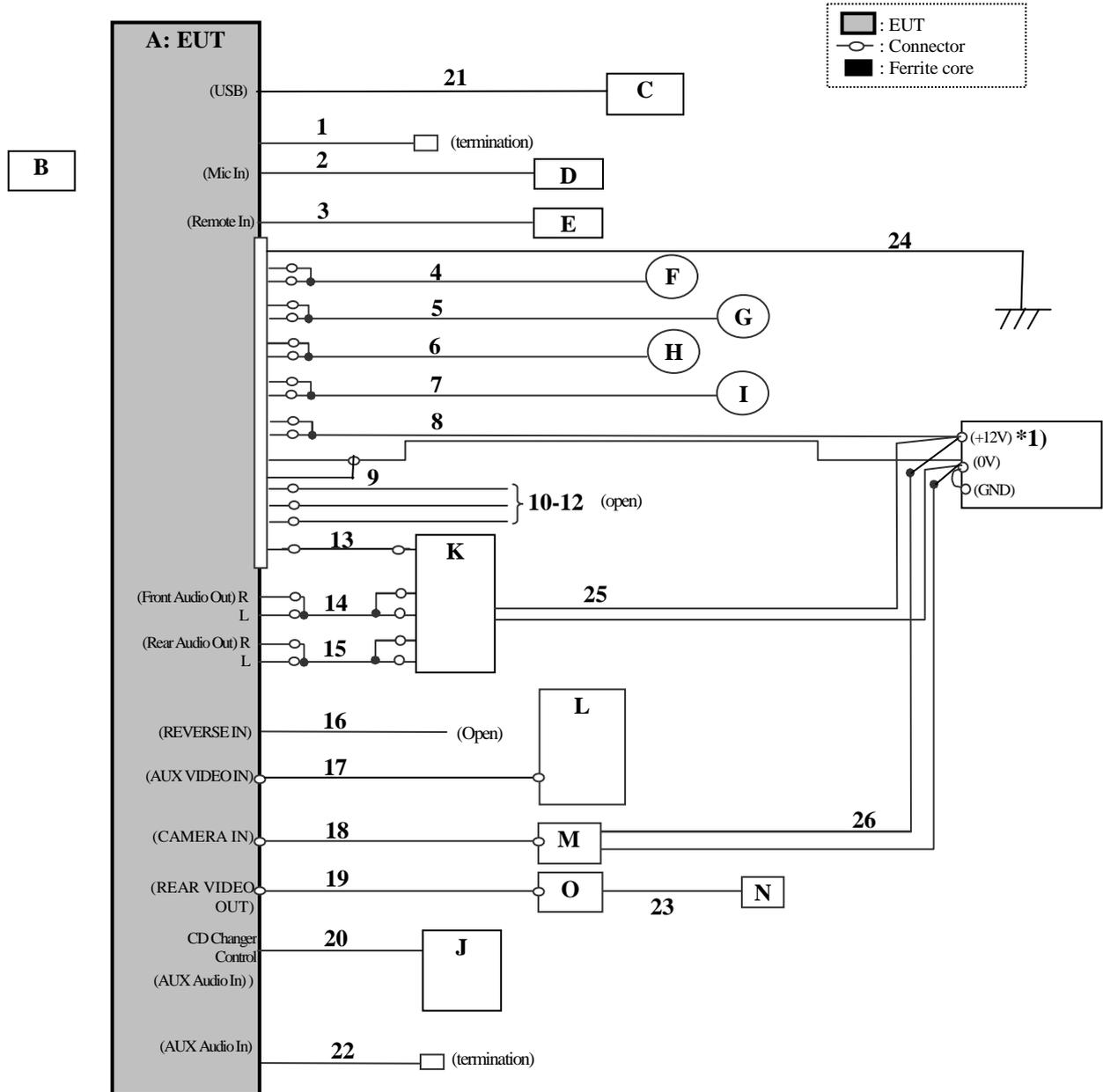
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## 4.2 Configuration and peripherals



\* Test data was taken under worse case conditions.

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### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	AV CENTER	XAV-64BT	6	Sony	EUT
B	Remote Controller	RM-X170	-	Sony	-
C	USB Memory	TS128MJF2A/120	154251 2718	Transcend	-
D	Microphone	XA-MC10	-	Sony	-
E	Wired Remote Controller	RM-X4S	-	Sony	-
F	Speaker 1	XS-F1611	-	Sony	-
G	Speaker 2	XS-F1611	-	Sony	-
H	Speaker 3	1-544-814-31	-	AIWA	-
I	Speaker 4	1-544-814-31	-	AIWA	-
J	CD Changer	CDX-T67	22634	Sony	-
K	Stereo Power Amplifier	XM-423SL	0020316	Sony	-
L	Digital Video Cassette Recorder	GV-D900	30729	Sony	-
M	Rear View CCD Camera	HCE-C100	W80316932	ALPINE	-
N	Rear View CCD Camera	HCE-C100	W80316932	ALPINE	-
O	Mobile Monitor	XVM-B62	3504390	Sony	-

\*1) DC power supply (Model No.: PAN35-10A) was used for DC 12V input.

### List of cables used

No.	Cable name	Length (m)	Shield		Remarks
			Cable	Connector	
1	FM antenna	1.0	Shielded	Shielded	-
2	External Microphone	0.25+4.0	Unshielded	Unshielded	-
3	REMOTE IN	1.9	Unshielded	Unshielded	-
4	Speaker (1)	0.25+2.0	Unshielded	Unshielded	-
5	Speaker (2)	0.25+2.0	Unshielded	Unshielded	-
6	Speaker (3)	0.25+2.0	Unshielded	Unshielded	-
7	Speaker (4)	0.25+2.0	Unshielded	Unshielded	-
8	DC Power	3.3	Unshielded	Unshielded	-
9	Parking Brake	3.3	Unshielded	Unshielded	-
10	Illumination	0.2	Unshielded	Unshielded	-
11	ANT Control	0.2	Unshielded	Unshielded	-
12	Car telephone	0.2	Unshielded	Unshielded	-
13	Amp Remote	0.25+0.45	Unshielded	Unshielded	-
14	Audio (Front Audio Out)	5.5	Unshielded	Shielded	-
15	Audio (Rear Audio Out)	5.5	Unshielded	Shielded	-
16	REVERSE IN	0.14	Unshielded	Unshielded	-
17	AUX VIDEO IN	1.4	Shielded	Shielded	-
18	CAMERA IN	5.0	Unshielded	Shielded	-
19	REAR VIDEO OUT	5.0	Shielded	Shielded	-
20	Bus Control	5.5	Shielded	Shielded	-
21	USB	1.0	Shielded	Shielded	-
22	AUX Audio In (Front)	5.5	Unshielded	Shielded	-
23	CAMERA	3.0	Unshielded	Unshielded	-
24	ATT (FG)	0.2+0.2+2.0	Unshielded	Unshielded	-
25	DC Power	1.0	Unshielded	Unshielded	-
26	DC Power	1.0	Unshielded	Unshielded	-

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

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## **SECTION 5: Radiated emission**

### **5.1 Operating environment**

The test was carried out in No.2 Semi-Anechoic Chamber.

Temperature : See test data (APPENDIX 2)

Humidity : See test data (APPENDIX 2)

### **5.2 Test configuration**

EUT was placed on a platform of nominal size, 1m by 1.5m (for below 1GHz) or 1m by 2m (for above 1GHz), raised 80cm 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 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.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Photographs of the set up are shown in Appendix 1.

### **5.3 Test conditions**

Frequency range : 30MHz to 25GHz  
 Test distance : 3m(below 13GHz) / 1m(above 13GHz)  
 EUT position : Table top  
 EUT operation mode : Refer to SECTION 4.1

### **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 13GHz) / 1m(above 13GHz) (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	1000-25000MHz	
Detection Type	:	Quasi-Peak	Peak	* Average
IF Bandwidth	:	120kHz	RBW:1MHz/VBW:3MHz	RBW:1MHz/VBW:10Hz RBW:1MHz/VBW:270Hz *1)

\*1) Used for the band edge of the carrier and the harmonics that can be measured. The VBW is based on the inverse of the duty cycle (Refer to the data).

\* When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

The EUT was tested in the direction normally used.

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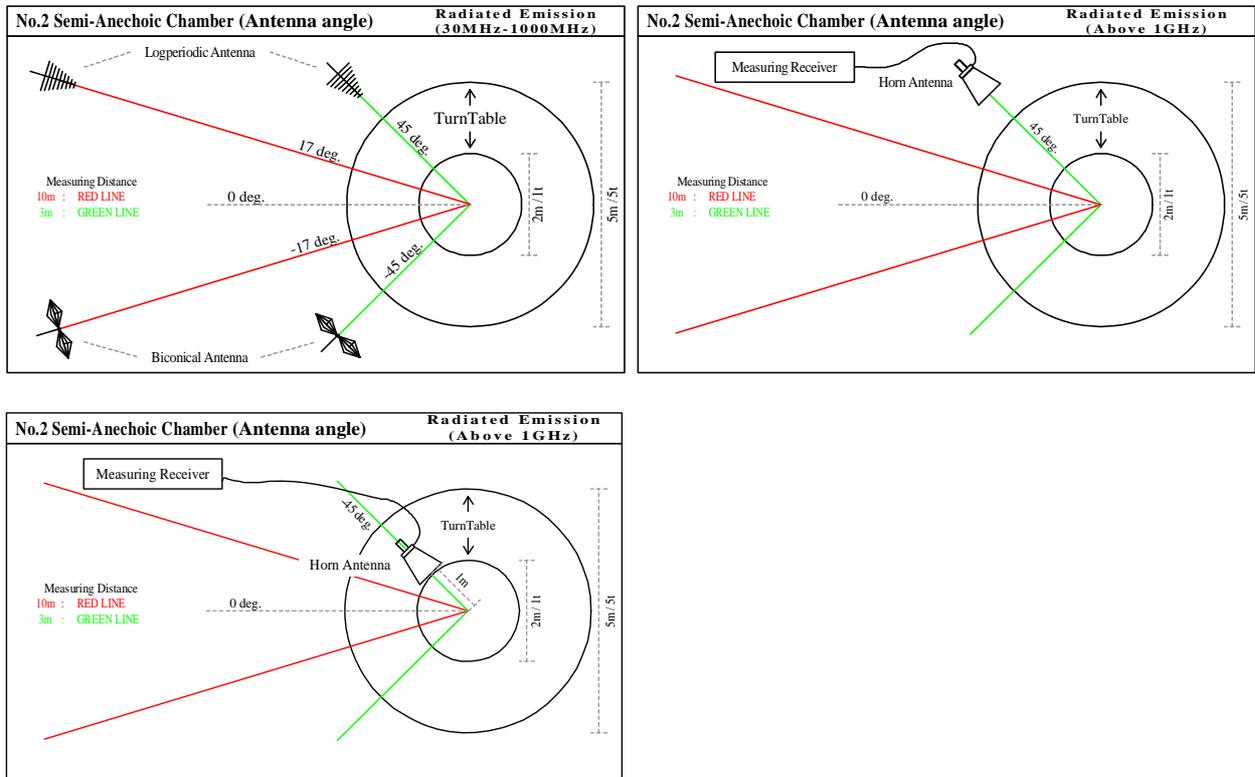
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Figure 1. Antenna angle



### 5.5 Band edge

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

### 5.6 Results

Summary of the test results : Pass \*No noise was detected above the 5<sup>th</sup> order harmonics.  
Refer to APPENDIX 1

## **SECTION 6: Spurious emissions (Antenna port conducted)**

### **Test procedure**

The spurious emissions were 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

## **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.

The channel separation in Hopping mode and Inquiry mode was separated by 25kHz and 2/3 of the 20dB bandwidth.

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 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

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## **Contents of appendixes**

### **APPENDIX 1: Test data**

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

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

Test instruments

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

Radiated emission

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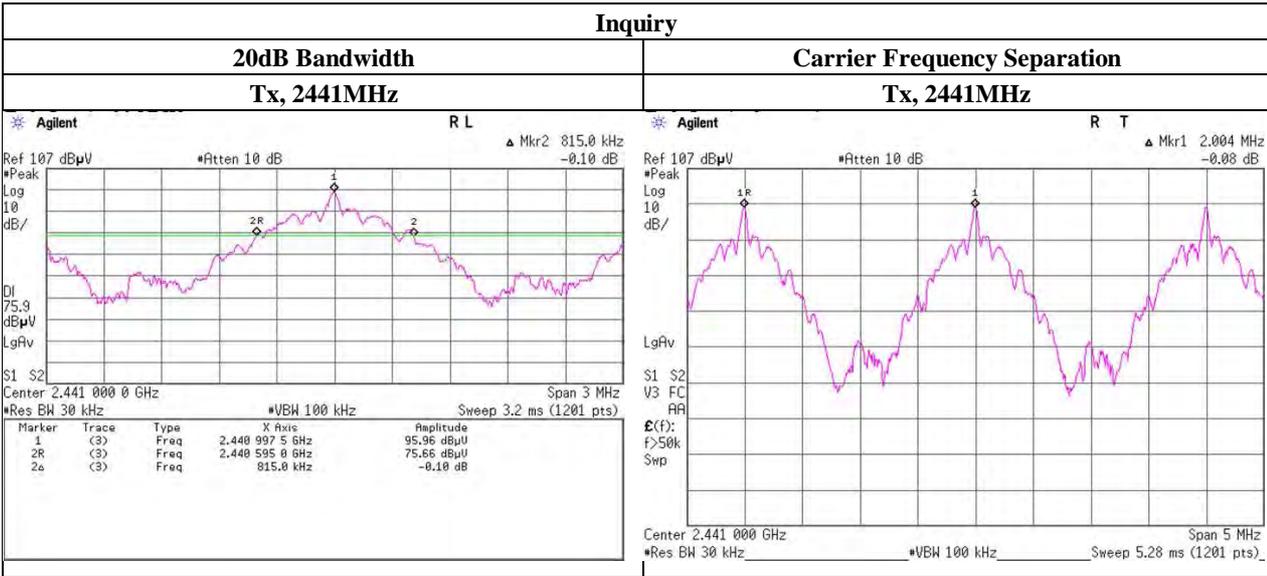
**APPENDIX 1: Test data**

**20dB Bandwidth and Carrier Frequency Separation**

Test place                   UL Japan, Inc. Shonan EMC Lab.    No.5 Shielded Room  
 Date                         November 22, 2011  
 Temperature / Humidity    25deg.C       , 30%RH  
 Engineer                  Shinichi Takano  
 Mode                        Tx, Bluetooth, BDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.943	1.003	>= 0.628
DH5	2441.0	0.933	1.003	>= 0.622
DH5	2480.0	0.940	1.003	>= 0.627
Inquiry	2441.0	0.815	2.004	>= 0.543

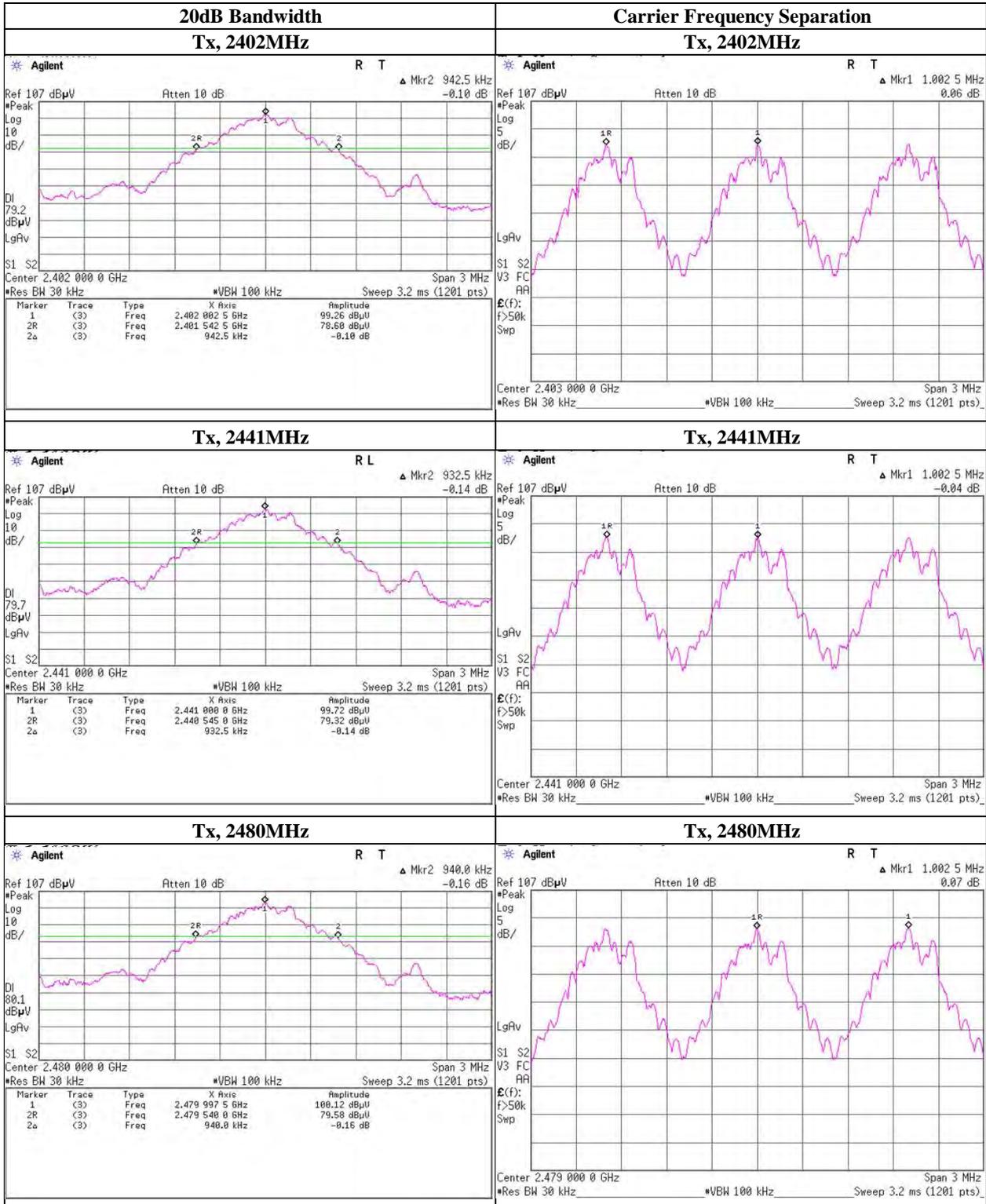
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).  
 No limit applies to 20dB Bandwidth.



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## 20dB Bandwidth and Carrier Frequency Separation

**Tx, Bluetooth, BDR, PRBS9**



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## 20dB Bandwidth and Carrier Frequency Separation

Test place                   UL Japan, Inc. Shonan EMC Lab.    No.5 Shielded Room  
 Date                         November 22, 2011  
 Temperature / Humidity    25deg.C       , 30%RH  
 Engineer                    Shinichi Takano  
 Mode                        Tx, Bluetooth, EDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.290	1.003	>= 0.860
3-DH5	2441.0	1.285	1.003	>= 0.857
3-DH5	2480.0	1.285	1.003	>= 0.857

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

No limit applies to 20dB Bandwidth.

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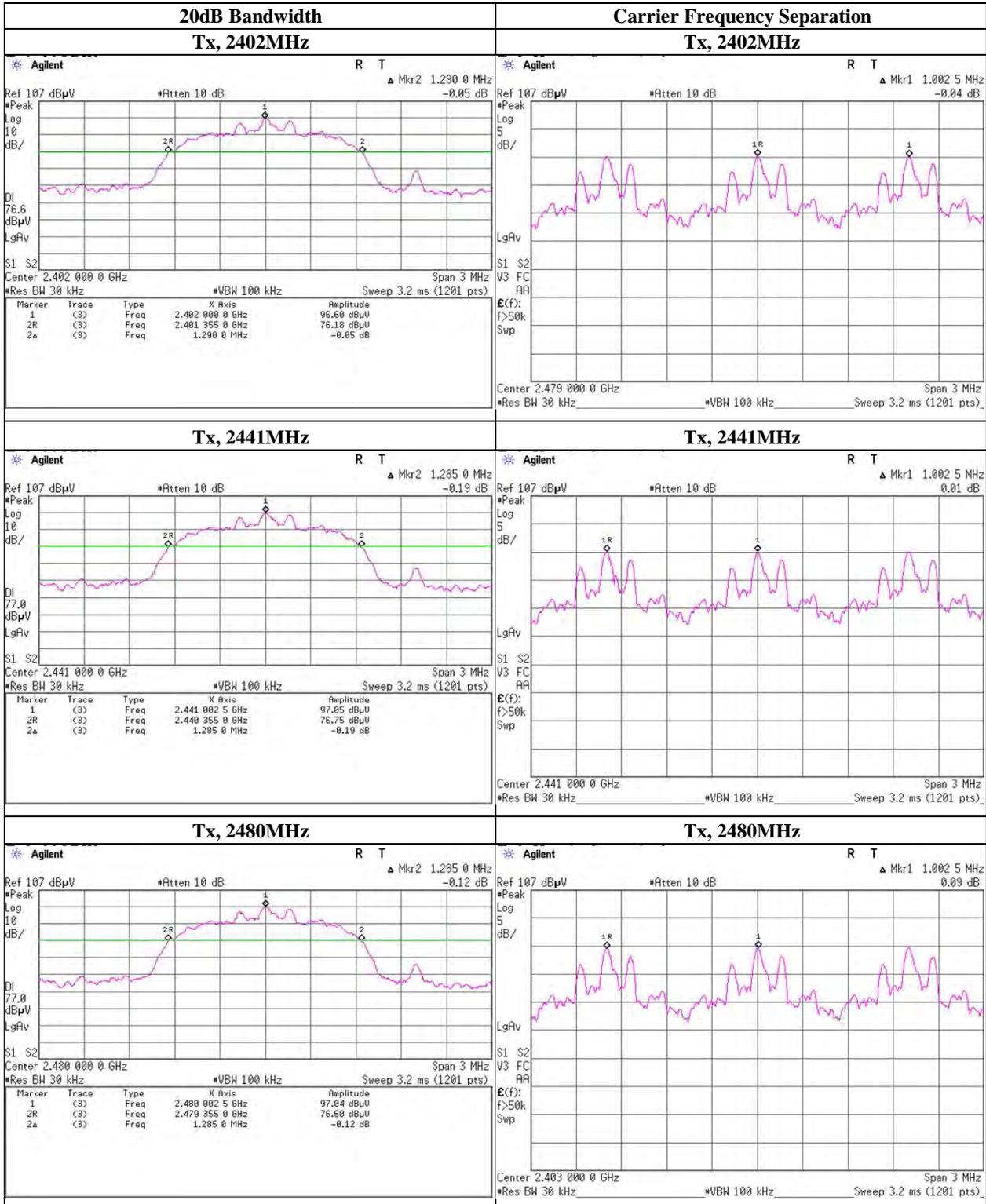
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone    : +81 463 50 6400

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## 20dB Bandwidth and Carrier Frequency Separation

**Tx, Bluetooth, EDR, PRBS9**



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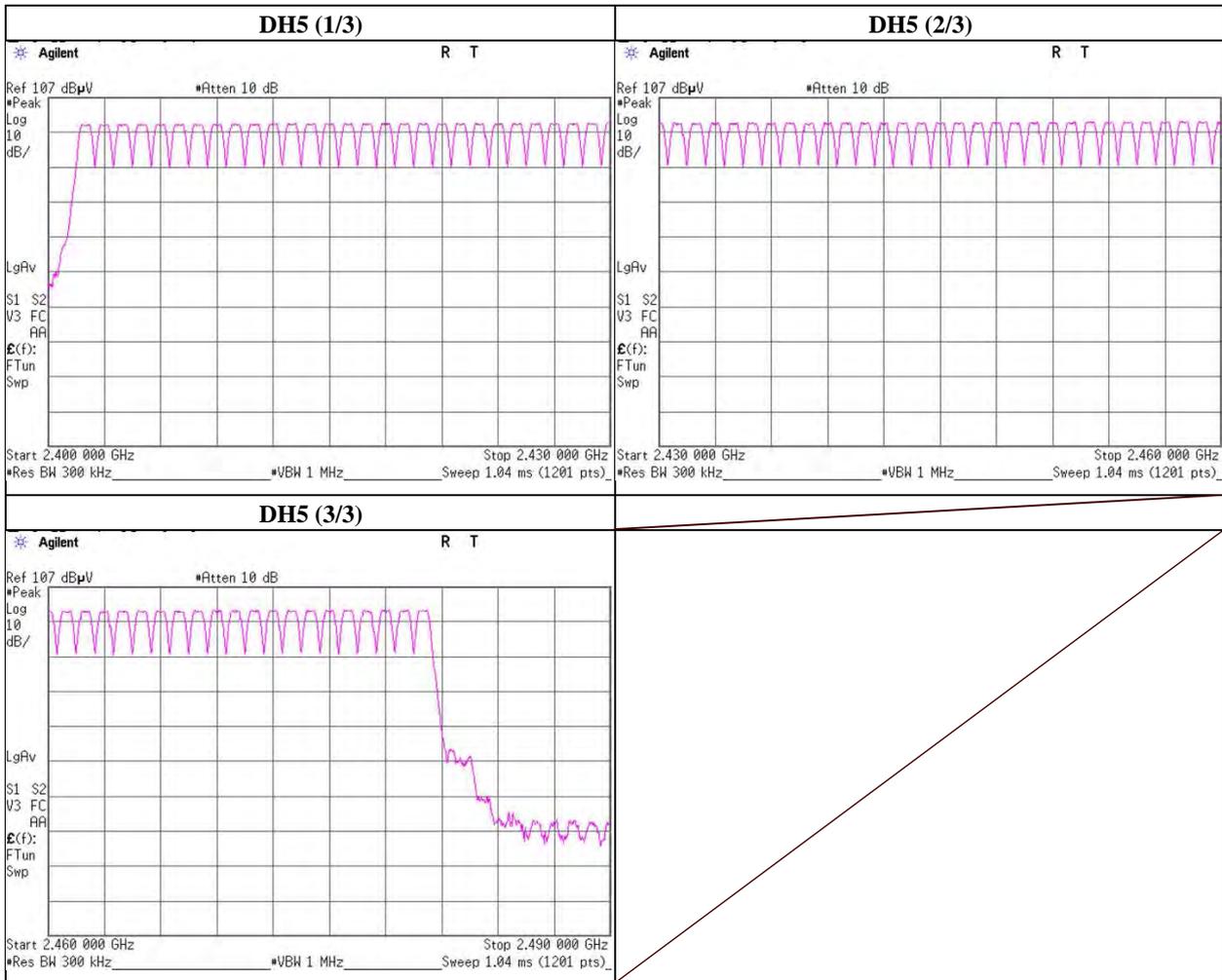
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.
Date	November 22, 2011
Temperature / Humidity	25deg.C , 30%RH
Engineer	Shinichi Takano
Mode	Tx, Bluetooth, BDR, PRBS9

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

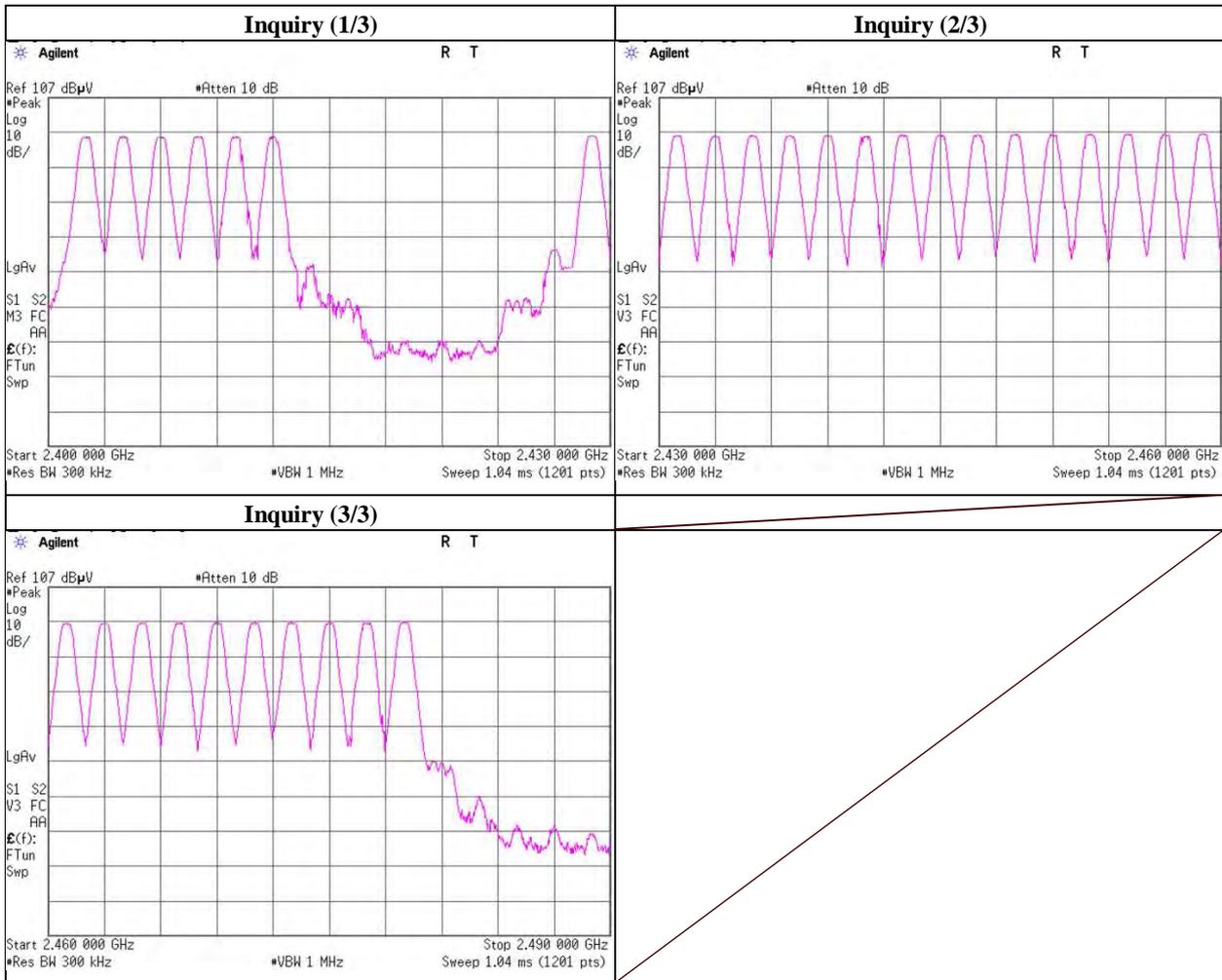


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### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.
Date	November 22, 2011
Temperature / Humidity	25deg.C , 30%RH
Engineer	Shinichi Takano
Mode	Tx, Bluetooth, Inquiry

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

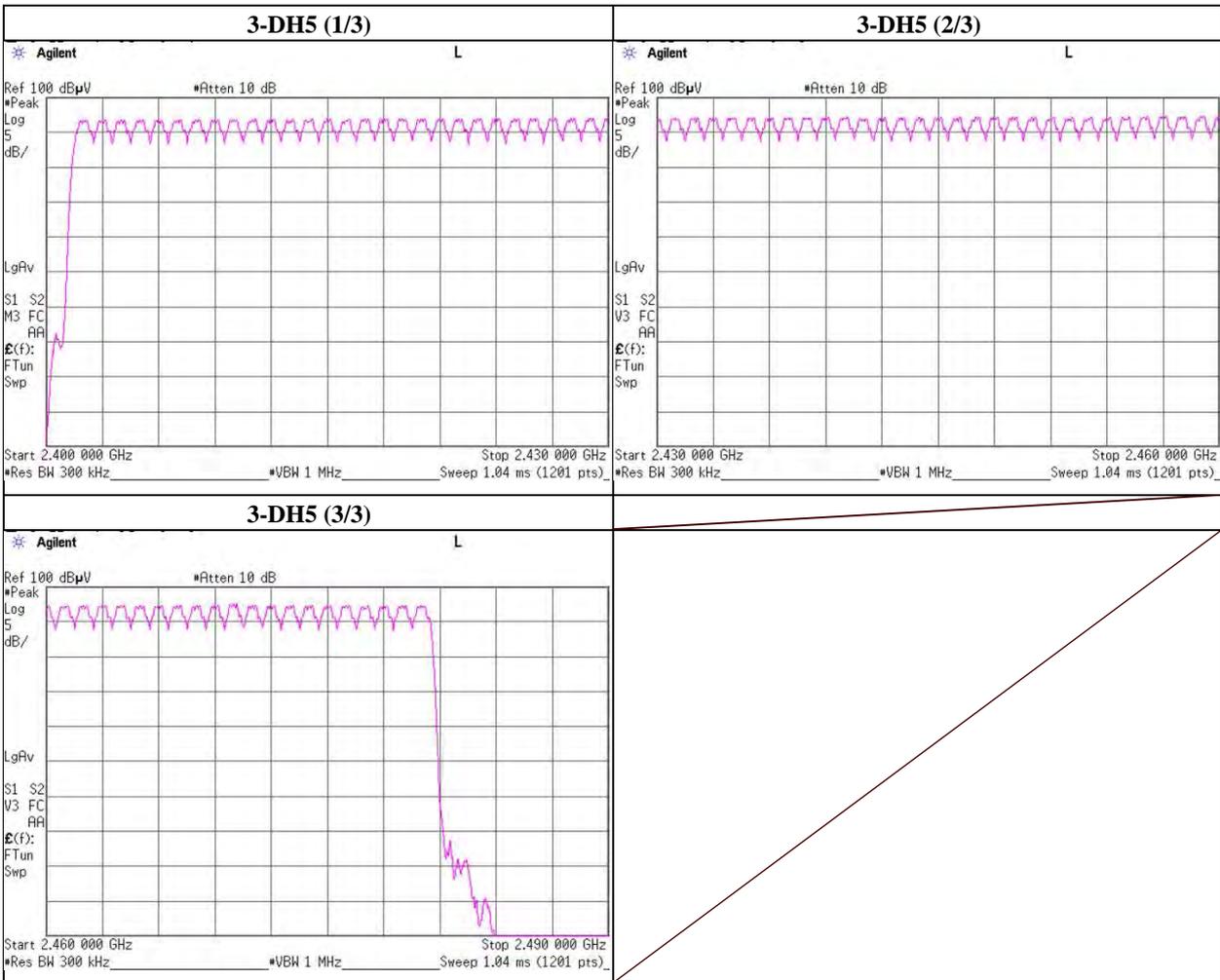


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### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.
Date	November 22, 2011
Temperature / Humidity	25deg.C , 30%RH
Engineer	Shinichi Takano
Mode	Tx, Bluetooth, EDR, PRBS9

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



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## Dwell Time

Test place           UL Japan, Inc. Shonan EMC Lab.   No.5 Shielded Room  
 Date                 December 1, 2011  
 Temperature / Humidity 24deg.C   , 38%RH  
 Engineer            Shinichi Takano  
 Mode                Tx, Bluetooth, BDR, PRBS9

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period				Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.6	/ 5.0 sec.	x 31.6 sec.	= 320 times	0.404	129	400
DH3	25.2	/ 5.0 sec.	x 31.6 sec.	= 160 times	1.662	266	400
DH5	17.0	/ 5.0 sec.	x 31.6 sec.	= 108 times	2.911	314	400
Inquiry	100.0	/ 1.0 sec.	x 12.8 sec.	= 1280 times	0.106	135	400

Sample Calculation

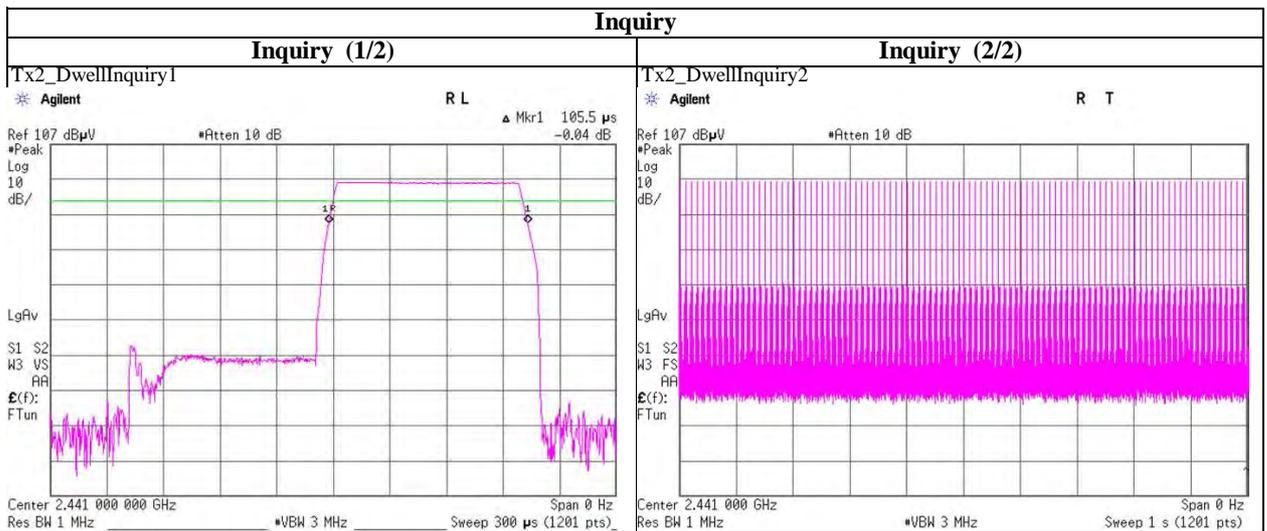
Result = Number of transmission x Length of transmittion time

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

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	51	51	51	50	50.6
DH3	25	25	25	25	26	25.2
DH5	17	17	17	17	17	17.0
Inquiry	100	100	100	100	100	100.0

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5



**UL Japan, Inc.**

**Shonan EMC Lab.**

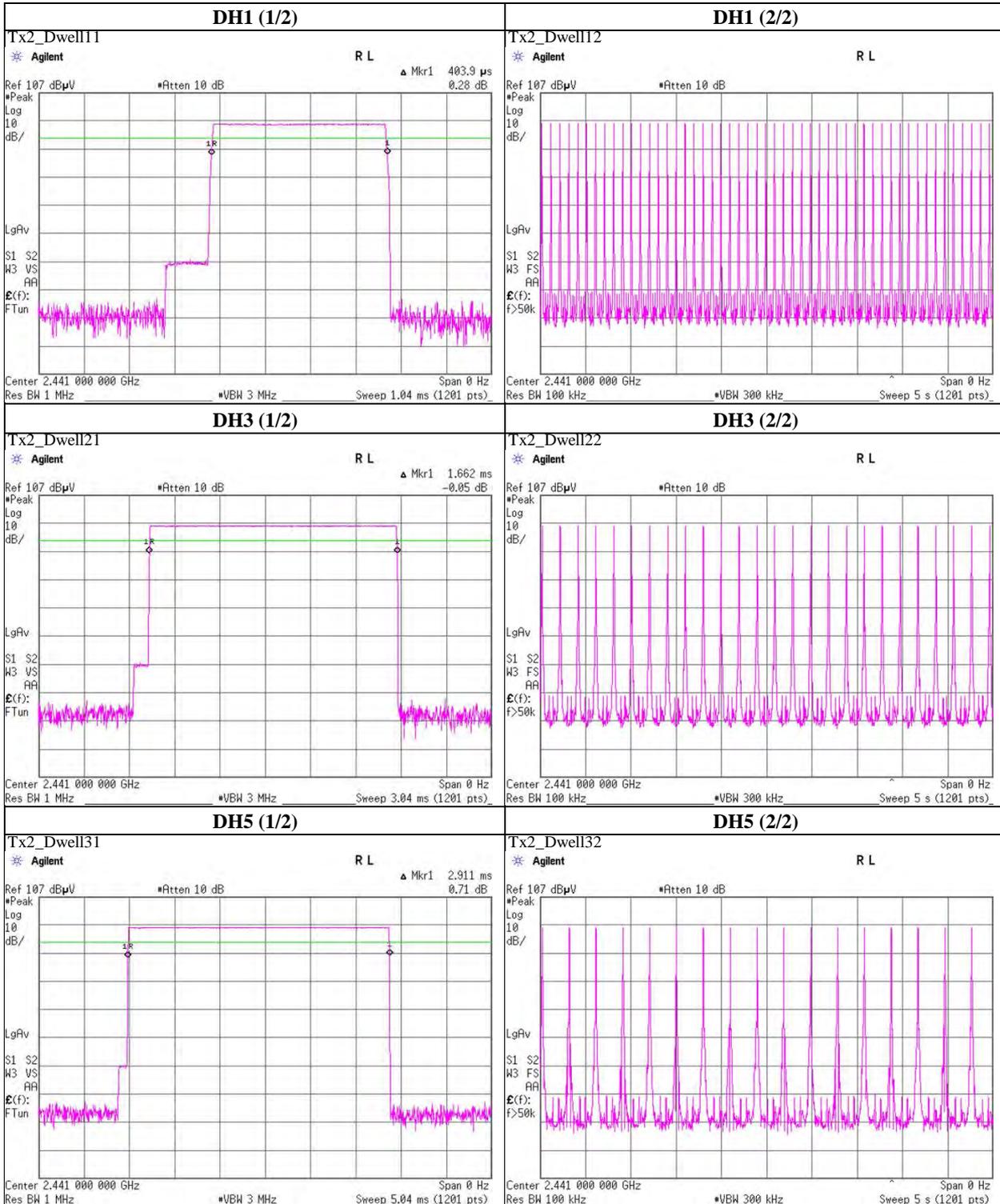
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## Dwell time

### Tx, Bluetooth, BDR, PRBS9



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## Dwell Time

Test place           UL Japan, Inc. Shonan EMC Lab.   No.5 Shielded Room  
 Date                December 1, 2011  
 Temperature / Humidity   24deg.C   , 38%RH  
 Engineer            Shinichi Takano  
 Mode                Tx, Bluetooth, EDR, 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]
3-DH1	50.4 / 5.0 sec. x 31.6 sec. = 319 times	0.418	133	400
3-DH3	25.6 / 5.0 sec. x 31.6 sec. = 162 times	1.669	270	400
3-DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.919	315	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	50	50	50	51	51	50.4
3-DH3	26	25	26	26	25	25.6
3-DH5	17	17	17	17	17	17.0

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

**UL Japan, Inc.**

**Shonan EMC Lab.**

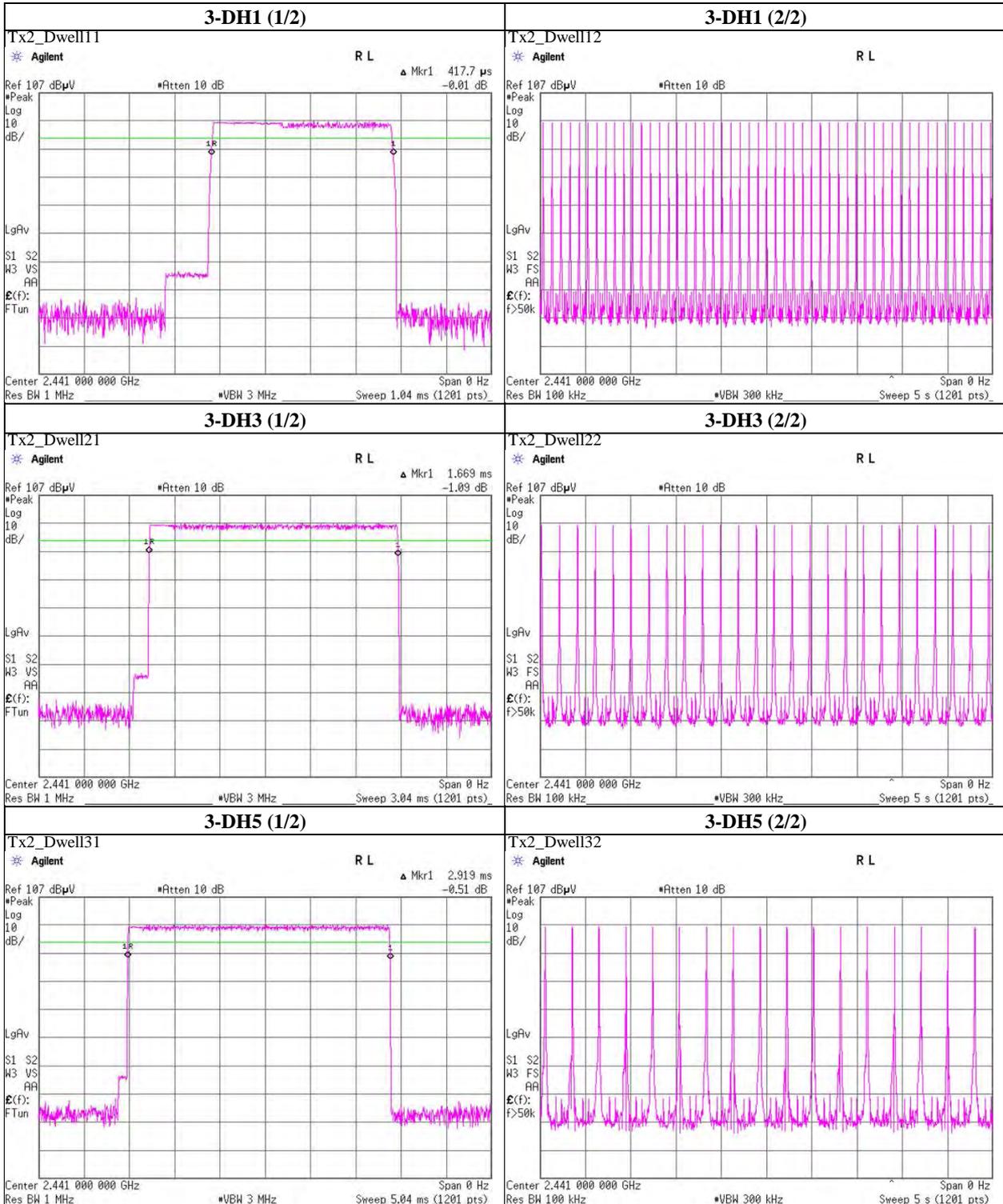
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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## Dwell time

### Tx, Bluetooth, EDR, PRBS9



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## Peak Output Power (Conducted)

Test place           UL Japan, Inc. Shonan EMC Lab.       No.5 Shielded Room  
 Date                 December 1, 2011  
 Temperature / Humidity   24deg.C     , 38%RH  
 Engineer             Shinichi Takano  
 Mode                 Tx, Bluetooth, BDR/EDR

(\* 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	-11.09	1.57	9.57	0.06	1.01	20.97	125	20.91
DH5	2441.0	-10.63	1.59	9.57	0.54	1.13	20.97	125	20.43
DH5	2480.0	-10.26	1.61	9.57	0.93	1.24	20.97	125	20.04
2-DH5	2402.0	-10.01	1.57	9.57	1.14	1.30	20.97	125	19.83
2-DH5	2441.0	-9.65	1.59	9.57	1.52	1.42	20.97	125	19.45
2-DH5	2480.0	-9.54	1.61	9.57	1.65	1.46	20.97	125	19.32
3-DH5	2402.0	-9.99	1.57	9.57	1.16	1.31	20.97	125	19.81
3-DH5	2441.0	-9.56	1.59	9.57	1.61	1.45	20.97	125	19.36
3-DH5	2480.0	-9.45	1.61	9.57	1.74	1.49	20.97	125	19.23

Sample Calculation:

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

**UL Japan, Inc.**  
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## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.2 Semi Anechoic Chamber  
 Date                              November 28, 2011                              December 3, 2011  
 Temperature / Humidity      25deg.C , 31%                              20deg.C , 39%RH  
 Engineer                        Kenichi Adachi                              Akira Sato  
 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.	74.12	QP	38.6	6.5	7.6	31.9	20.8	40	19.2	264	74	
Hori.	215.999	QP	31.6	16.7	9.4	31.7	26	43.5	17.5	190	0	
Hori.	264.015	QP	31.5	17.9	10	31.7	27.7	46	18.3	122	174	
Hori.	480.056	QP	45.2	18.2	8	31.6	39.8	46	6.2	100	349	
Hori.	604.372	QP	44	19.5	8.6	31.6	40.5	46	5.5	196	79	
Hori.	792.054	QP	39.4	22	9.5	31.4	39.5	46	6.5	152	69	
Hori.	1079.782	PK	45.2	23.9	12.4	38.9	42.6	73.9	31.3	100	0	
Hori.	1602.029	PK	46.1	25.1	12.9	38.4	45.7	73.9	28.2	100	40	
Hori.	2390	PK	40.9	27.2	13.7	37.8	44	73.9	29.9	103	357	
Hori.	2400	PK	49.3	27.3	13.7	37.8	52.5	73.9	21.4	103	357	
Hori.	4804	PK	50.8	31.2	5.9	36.6	51.3	73.9	22.6	100	243	
Hori.	7206	PK	46.1	36.5	7.3	38.4	51.5	73.9	22.4	100	23	
Hori.	9608	PK	43.1	38.3	8.6	37.1	52.9	73.9	21	100	3	
Hori.	12010	PK	45.7	39.3	9.9	37.9	57	73.9	16.9	100	11	
Hori.	1079.782	AV	30.7	23.9	12.4	38.9	28.1	53.9	25.8	100	0	AV:1MHz/10Hz
Hori.	1602.029	AV	37.4	25.1	12.9	38.4	37	53.9	16.9	100	40	AV:1MHz/10Hz
Hori.	2390	AV	32.1	27.2	13.7	37.8	35.2	53.9	18.7	103	357	AV:1MHz/270Hz
Hori.	2400	AV	41.3	27.3	13.7	37.8	44.5	53.9	9.4	103	357	AV:1MHz/270Hz
Hori.	4804	AV	44	31.2	5.9	36.6	44.5	53.9	9.4	100	243	AV:1MHz/270Hz
Hori.	7206	AV	34.1	36.5	7.3	38.4	39.5	53.9	14.4	100	23	AV:1MHz/270Hz
Hori.	9608	AV	31.8	38.3	8.6	37.1	41.6	53.9	12.3	100	3	AV:1MHz/270Hz
Hori.	12010	AV	33.4	39.3	9.9	37.9	44.7	53.9	9.2	100	11	AV:1MHz/270Hz
Vert.	58.331	QP	34.8	8.5	7.4	31.9	18.8	40	21.2	100	185	
Vert.	110.41	QP	29.6	11.6	8.1	31.8	17.5	43.5	26	100	224	
Vert.	264.015	QP	29.1	17.9	10	31.7	25.3	46	20.7	100	62	
Vert.	480.056	QP	38.9	18.2	8	31.6	33.5	46	12.5	128	187	
Vert.	598.347	QP	41.2	19.5	8.6	31.6	37.7	46	8.3	132	54	
Vert.	792.054	QP	35.6	22	9.5	31.4	35.7	46	10.3	100	1	
Vert.	1079.782	PK	51	23.9	12.4	38.9	48.4	73.9	25.5	100	0	
Vert.	1602.029	PK	48.7	25.1	12.9	38.4	48.3	73.9	25.6	124	72	
Vert.	2390	PK	42.3	27.2	13.7	37.8	45.4	73.9	28.5	126	232	
Vert.	2400	PK	49.3	27.3	13.7	37.8	52.5	73.9	21.4	126	232	
Vert.	4804	PK	52	31.2	5.9	36.6	52.5	73.9	21.4	115	265	
Vert.	7206	PK	46.9	36.5	7.3	38.4	52.3	73.9	21.6	100	13	
Vert.	9608	PK	41.7	38.3	8.6	37.1	51.5	73.9	22.4	100	286	
Vert.	12010	PK	45.3	39.3	9.9	37.9	56.6	73.9	17.3	100	33	
Vert.	1079.782	AV	35.2	23.9	12.4	38.9	32.6	53.9	21.3	100	0	AV:1MHz/10Hz
Vert.	1602.029	AV	42.3	25.1	12.9	38.4	41.9	53.9	12	124	72	AV:1MHz/10Hz
Vert.	2390	AV	32.7	27.2	13.7	37.8	35.8	53.9	18.1	126	232	AV:1MHz/270Hz
Vert.	2400	AV	40.8	27.3	13.7	37.8	44	53.9	9.9	126	232	AV:1MHz/270Hz
Vert.	4804	AV	47.9	31.2	5.9	36.6	48.4	53.9	5.5	115	265	AV:1MHz/270Hz
Vert.	7206	AV	34.2	36.5	7.3	38.4	39.6	53.9	14.3	100	13	AV:1MHz/270Hz
Vert.	9608	AV	32.3	38.3	8.6	37.1	42.1	53.9	11.8	100	286	AV:1MHz/270Hz
Vert.	12010	AV	33.4	39.3	9.9	37.9	44.7	53.9	9.2	100	33	AV:1MHz/270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

Distance factor:                      13GHz-26.5GHz                      20log(3.0m/1.0m)= 9.5dB

## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.2 Semi Anechoic Chamber  
 Date                              November 28, 2011                              December 3, 2011  
 Temperature / Humidity      25deg.C , 31%                              20deg.C , 39%RH  
 Engineer                        Kenichi Adachi                              Akira Sato  
 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.	74.115	QP	38.3	6.5	7.6	31.9	20.5	40	19.5	263	78	
Hori.	480.054	QP	44.9	18.2	8	31.6	39.5	46	6.5	100	347	
Hori.	604.425	QP	43.8	19.5	8.6	31.6	40.3	46	5.7	194	84	
Hori.	792.055	QP	39.3	22	9.5	31.4	39.4	46	6.6	152	71	
Hori.	1080.08	PK	45	23.9	12.4	38.9	42.4	73.9	31.5	100	336	
Hori.	1628.116	PK	47.1	25.2	12.9	38.4	46.8	73.9	27.1	100	157	
Hori.	4882	PK	52.5	31.4	5.9	36.6	53.2	73.9	20.7	134	194	
Hori.	7323	PK	46.3	36.7	7.4	38.4	52	73.9	21.9	100	36	
Hori.	9764	PK	43.7	38.7	8.6	37.1	53.9	73.9	20	100	356	
Hori.	12205	PK	44.8	39.4	9.9	38	56.1	73.9	17.8	100	122	
Hori.	1080.08	AV	33	23.9	12.4	38.9	30.4	53.9	23.5	100	336	AV:1MHz/10Hz
Hori.	1628.116	AV	38.1	25.2	12.9	38.4	37.8	53.9	16.1	100	157	AV:1MHz/10Hz
Hori.	4882	AV	47	31.4	5.9	36.6	47.7	53.9	6.2	134	194	AV:1MHz/270Hz
Hori.	7323	AV	33.7	36.7	7.4	38.4	39.4	53.9	14.5	100	36	AV:1MHz/270Hz
Hori.	9764	AV	31.6	38.7	8.6	37.1	41.8	53.9	12.1	100	356	AV:1MHz/270Hz
Hori.	12205	AV	31.6	39.4	9.9	38	42.9	53.9	11	100	122	AV:1MHz/270Hz
Vert.	58.317	QP	34.6	8.5	7.4	31.9	18.6	40	21.4	100	178	
Vert.	480.054	QP	38.6	18.2	8	31.6	33.2	46	12.8	127	191	
Vert.	598.344	QP	41	19.5	8.6	31.6	37.5	46	8.5	129	48	
Vert.	792.055	QP	35.5	22	9.5	31.4	35.6	46	10.4	100	359	
Vert.	1080.08	PK	50.1	23.9	12.4	38.9	47.5	73.9	26.4	100	35	
Vert.	1628.116	PK	49.4	25.2	12.9	38.4	49.1	73.9	24.8	100	22	
Vert.	4882	PK	53.7	31.4	5.9	36.6	54.4	73.9	19.5	100	276	
Vert.	7323	PK	45.6	36.7	7.4	38.4	51.3	73.9	22.6	100	11	
Vert.	9764	PK	44.8	38.7	8.6	37.1	55	73.9	18.9	100	30	
Vert.	12205	PK	46.1	39.4	9.9	38	57.4	73.9	16.5	100	348	
Vert.	1080.08	AV	36.7	23.9	12.4	38.9	34.1	53.9	19.8	100	35	AV:1MHz/10Hz
Vert.	1628.116	AV	42.9	25.2	12.9	38.4	42.6	53.9	11.3	100	22	AV:1MHz/10Hz
Vert.	4882	AV	49.1	31.4	5.9	36.6	49.8	53.9	4.1	100	276	AV:1MHz/270Hz
Vert.	7323	AV	33.6	36.7	7.4	38.4	39.3	53.9	14.6	100	11	AV:1MHz/270Hz
Vert.	9764	AV	31.6	38.7	8.6	37.1	41.8	53.9	12.1	100	30	AV:1MHz/270Hz
Vert.	12205	AV	33.2	39.4	9.9	38	44.5	53.9	9.4	100	348	AV:1MHz/270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

Distance factor:            13GHz-26.5GHz            20log(3.0m/1.0m)= 9.5dB

## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.2 Semi Anechoic Chamber  
 Date                              November 28, 2011                              December 3, 2011  
 Temperature / Humidity      25deg.C , 31%                              20deg.C , 39%RH  
 Engineer                         Kenichi Adachi                              Akira Sato  
 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.	74.268	QP	38.5	6.5	7.6	31.9	20.7	40	19.3	265	78	
Hori.	480.056	QP	45.3	18.2	8	31.6	39.9	46	6.1	100	348	
Hori.	604.486	QP	43.9	19.5	8.6	31.6	40.4	46	5.6	189	73	
Hori.	792.052	QP	39	22	9.5	31.4	39.1	46	6.9	151	75	
Hori.	1080.04	PK	45.6	23.9	12.4	38.9	43	73.9	30.9	100	192	
Hori.	1654	PK	46.6	25.2	13	38.4	46.4	73.9	27.5	100	225	
Hori.	2483.5	PK	47.5	27.5	13.6	37.6	51	73.9	22.9	136	196	
Hori.	2484.5	PK	47.7	27.5	13.6	37.6	51.2	73.9	22.7	136	196	
Hori.	4960	PK	51.9	31.6	5.9	36.5	52.9	73.9	21	140	212	
Hori.	7440	PK	47	37	7.3	38.4	52.9	73.9	21	100	6	
Hori.	9920	PK	44.3	39	8.6	37.2	54.7	73.9	19.2	100	336	
Hori.	12400	PK	44.3	39.5	9.9	38	55.7	73.9	18.2	100	60	
Hori.	1080.04	AV	32.1	23.9	12.4	38.9	29.5	53.9	24.4	100	192	AV:1MHz/10Hz
Hori.	1654	AV	39	25.2	13	38.4	38.8	53.9	15.1	100	225	AV:1MHz/10Hz
Hori.	2483.5	AV	39.7	27.5	13.6	37.6	43.2	53.9	10.7	136	196	AV:1MHz/270Hz
Hori.	2484.5	AV	37.1	27.5	13.6	37.6	40.6	53.9	13.3	136	196	AV:1MHz/270Hz
Hori.	4960	AV	46.2	31.6	5.9	36.5	47.2	53.9	6.7	140	212	AV:1MHz/270Hz
Hori.	7440	AV	35.6	37	7.3	38.4	41.5	53.9	12.4	100	6	AV:1MHz/270Hz
Hori.	9920	AV	32.3	39	8.6	37.2	42.7	53.9	11.2	100	336	AV:1MHz/270Hz
Hori.	12400	AV	32.9	39.5	9.9	38	44.3	53.9	9.6	100	60	AV:1MHz/270Hz
Vert.	58.322	QP	34.7	8.5	7.4	31.9	18.7	40	21.3	100	182	
Vert.	480.056	QP	38.8	18.2	8	31.6	33.4	46	12.6	124	184	
Vert.	598.335	QP	41.1	19.5	8.6	31.6	37.6	46	8.4	134	56	
Vert.	792.052	QP	35.2	22	9.5	31.4	35.3	46	10.7	100	359	
Vert.	1080.04	PK	49.4	23.9	12.4	38.9	46.8	73.9	27.1	107	14	
Vert.	1654	PK	50.3	25.2	13	38.4	50.1	73.9	23.8	119	69	
Vert.	2483.5	PK	45.1	27.5	13.6	37.6	48.6	73.9	25.3	172	203	
Vert.	2484.5	PK	46.1	27.5	13.6	37.6	49.6	73.9	24.3	172	203	
Vert.	4960	PK	53	31.6	5.9	36.5	54	73.9	19.9	100	265	
Vert.	7440	PK	47.3	37	7.3	38.4	53.2	73.9	20.7	100	38	
Vert.	9920	PK	42.9	39	8.6	37.2	53.3	73.9	20.6	100	0	
Vert.	12400	PK	43.6	39.5	9.9	38	55	73.9	18.9	100	0	
Vert.	1080.04	AV	35.9	23.9	12.4	38.9	33.3	53.9	20.6	107	14	AV:1MHz/270Hz
Vert.	1654	AV	45.3	25.2	13	38.4	45.1	53.9	8.8	119	69	AV:1MHz/10Hz
Vert.	2483.5	AV	36.3	27.5	13.6	37.6	39.8	53.9	14.1	172	203	AV:1MHz/270Hz
Vert.	2484.5	AV	32.9	27.5	13.6	37.6	36.4	53.9	17.5	172	203	AV:1MHz/270Hz
Vert.	4960	AV	48.2	31.6	5.9	36.5	49.2	53.9	4.7	100	265	AV:1MHz/270Hz
Vert.	7440	AV	33.4	37	7.3	38.4	39.3	53.9	14.6	100	38	AV:1MHz/270Hz
Vert.	9920	AV	31.2	39	8.6	37.2	41.6	53.9	12.3	100	0	AV:1MHz/270Hz
Vert.	12400	AV	31.9	39.5	9.9	38	43.3	53.9	10.6	100	0	AV:1MHz/270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

Distance factor:                      13GHz-26.5GHz                      20log(3.0m/1.0m)= 9.5dB

## Radiated Emission

Test place                    UL Japan, Inc. Shonan EMC Lab.                    No.2 Semi Anechoic Chamber  
 Date                            November 28, 2011                                          December 3, 2011  
 Temperature / Humidity    25deg.C , 31%                                                20deg.C , 39%RH  
 Engineer                        Kenichi Adachi                                                Akira Sato  
 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.	74.145	QP	38.1	6.5	7.6	31.9	20.3	40	19.7	256	71	
Hori.	480.057	QP	45.1	18.2	8	31.6	39.7	46	6.3	100	351	
Hori.	604.493	QP	43.6	19.5	8.6	31.6	40.1	46	5.9	192	68	
Hori.	792.059	QP	38.7	22	9.5	31.4	38.8	46	7.2	152	62	
Hori.	1079.948	PK	45.2	23.9	12.4	38.9	42.6	73.9	31.3	100	134	
Hori.	1602.011	PK	46.3	25.1	12.9	38.4	45.9	73.9	28	100	206	
Hori.	2390	PK	41.6	27.2	13.7	37.8	44.7	73.9	29.2	159	356	
Hori.	2400	PK	56.3	27.3	13.7	37.8	59.5	73.9	14.4	159	356	
Hori.	4804	PK	45.4	31.2	5.9	36.6	45.9	73.9	28	100	53	
Hori.	7206	PK	46.6	36.5	7.3	38.4	52	73.9	21.9	100	49	
Hori.	9608	PK	44.4	38.3	8.6	37.1	54.2	73.9	19.7	100	122	
Hori.	12010	PK	46.4	39.3	9.9	37.9	57.7	73.9	16.2	100	355	
Hori.	1079.948	AV	32.2	23.9	12.4	38.9	29.6	53.9	24.3	100	134	AV:1MHz/10Hz
Hori.	1602.011	AV	36.6	25.1	12.9	38.4	36.2	53.9	17.7	100	206	AV:1MHz/10Hz
Hori.	2390	AV	32.2	27.2	13.7	37.8	35.3	53.9	18.6	159	356	AV:1MHz/270Hz
Hori.	2400	AV	44	27.3	13.7	37.8	47.2	53.9	6.7	159	356	AV:1MHz/270Hz
Hori.	4804	AV	34.9	31.2	5.9	36.6	35.4	53.9	18.5	100	53	AV:1MHz/270Hz
Hori.	7206	AV	34.1	36.5	7.3	38.4	39.5	53.9	14.4	100	49	AV:1MHz/270Hz
Hori.	9608	AV	32	38.3	8.6	37.1	41.8	53.9	12.1	100	122	AV:1MHz/270Hz
Hori.	12010	AV	33.5	39.3	9.9	37.9	44.8	53.9	9.1	100	355	AV:1MHz/270Hz
Vert.	58.353	QP	34	8.5	7.4	31.9	18	40	22	100	178	
Vert.	480.057	QP	38.6	18.2	8	31.6	33.2	46	12.8	123	191	
Vert.	598.338	QP	41.4	19.5	8.6	31.6	37.9	46	8.1	100	53	
Vert.	792.059	QP	35	22	9.5	31.4	35.1	46	10.9	100	2	
Vert.	1079.948	PK	49.6	23.9	12.4	38.9	47	73.9	26.9	100	32	
Vert.	1602.011	PK	48.4	25.1	12.9	38.4	48	73.9	25.9	114	68	
Vert.	2390	PK	42.9	27.2	13.7	37.8	46	73.9	27.9	154	237	
Vert.	2400	PK	52.5	27.3	13.7	37.8	55.7	73.9	18.2	154	237	
Vert.	4804	PK	48.4	31.2	5.9	36.6	48.9	73.9	25	100	251	
Vert.	7206	PK	45	36.5	7.3	38.4	50.4	73.9	23.5	100	23	
Vert.	9608	PK	43.1	38.3	8.6	37.1	52.9	73.9	21	100	11	
Vert.	12010	PK	45.7	39.3	9.9	37.9	57	73.9	16.9	100	5	
Vert.	1079.948	AV	36.4	23.9	12.4	38.9	33.8	53.9	20.1	100	32	AV:1MHz/10Hz
Vert.	1602.011	AV	42.9	25.1	12.9	38.4	42.5	53.9	11.4	114	68	AV:1MHz/10Hz
Vert.	2390	AV	32.5	27.2	13.7	37.8	35.6	53.9	18.3	154	237	AV:1MHz/270Hz
Vert.	2400	AV	41.1	27.3	13.7	37.8	44.3	53.9	9.6	154	237	AV:1MHz/270Hz
Vert.	4804	AV	37	31.2	5.9	36.6	37.5	53.9	16.4	100	251	AV:1MHz/270Hz
Vert.	7206	AV	34.8	36.5	7.3	38.4	40.2	53.9	13.7	100	23	AV:1MHz/270Hz
Vert.	9608	AV	32.4	38.3	8.6	37.1	42.2	53.9	11.7	100	11	AV:1MHz/270Hz
Vert.	12010	AV	32.3	39.3	9.9	37.9	43.6	53.9	10.3	100	5	AV:1MHz/270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

Distance factor:                    13GHz-26.5GHz                    20log(3.0m/1.0m)= 9.5dB

## Radiated Emission

Test place                    UL Japan, Inc. Shonan EMC Lab.                    No.2 Semi Anechoic Chamber  
 Date                            November 28, 2011                                          December 3, 2011  
 Temperature / Humidity    25deg.C , 31%                                              20deg.C , 39%RH  
 Engineer                      Kenichi Adachi                                              Akira Sato  
 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.	74.264	QP	37.8	6.5	7.6	31.9	20	40	20	248	66	
Hori.	480.053	QP	44.9	18.2	8	31.6	39.5	46	6.5	100	349	
Hori.	604.524	QP	43.8	19.5	8.6	31.6	40.3	46	5.7	189	69	
Hori.	792.053	QP	38.4	22	9.5	31.4	38.5	46	7.5	152	64	
Hori.	1080.122	PK	44.8	23.9	12.4	38.9	42.2	73.9	31.7	100	221	
Hori.	1627.862	PK	47.3	25.2	12.9	38.4	47	73.9	26.9	100	0	
Hori.	4882	PK	45.7	31.4	5.9	36.6	46.4	73.9	27.5	143	210	
Hori.	7323	PK	45.5	36.7	7.4	38.4	51.2	73.9	22.7	100	357	
Hori.	9764	PK	43.5	38.7	8.6	37.1	53.7	73.9	20.2	100	53	
Hori.	12205	PK	45.2	39.4	9.9	38	56.5	73.9	17.4	100	356	
Hori.	1080.122	AV	33.2	23.9	12.4	38.9	30.6	53.9	23.3	100	221	AV:1MHz/10Hz
Hori.	1627.862	AV	39.5	25.2	12.9	38.4	39.2	53.9	14.7	100	0	AV:1MHz/10Hz
Hori.	4882	AV	35.8	31.4	5.9	36.6	36.5	53.9	17.4	143	210	AV:1MHz/270Hz
Hori.	7323	AV	34	36.7	7.4	38.4	39.7	53.9	14.2	100	357	AV:1MHz/270Hz
Hori.	9764	AV	31.6	38.7	8.6	37.1	41.8	53.9	12.1	100	53	AV:1MHz/270Hz
Hori.	12205	AV	33	39.4	9.9	38	44.3	53.9	9.6	100	356	AV:1MHz/270Hz
Vert.	58.341	QP	33.9	8.5	7.4	31.9	17.9	40	22.1	100	181	
Vert.	480.053	QP	38.9	18.2	8	31.6	33.5	46	12.5	126	199	
Vert.	598.342	QP	41.1	19.5	8.6	31.6	37.6	46	8.4	100	49	
Vert.	792.053	QP	34.7	22	9.5	31.4	34.8	46	11.2	100	3	
Vert.	1080.122	PK	51.9	23.9	12.4	38.9	49.3	73.9	24.6	100	36	
Vert.	1627.862	PK	48.1	25.2	12.9	38.4	47.8	73.9	26.1	100	0	
Vert.	4882	PK	45.1	31.4	5.9	36.6	45.8	73.9	28.1	100	55	
Vert.	7323	PK	45.5	36.7	7.4	38.4	51.2	73.9	22.7	100	4	
Vert.	9764	PK	42.6	38.7	8.6	37.1	52.8	73.9	21.1	100	241	
Vert.	12205	PK	45.1	39.4	9.9	38	56.4	73.9	17.5	100	359	
Vert.	1080.122	AV	36	23.9	12.4	38.9	33.4	53.9	20.5	100	36	AV:1MHz/10Hz
Vert.	1627.862	AV	41.6	25.2	12.9	38.4	41.3	53.9	12.6	100	0	AV:1MHz/10Hz
Vert.	4882	AV	33.1	31.4	5.9	36.6	33.8	53.9	20.1	100	55	AV:1MHz/270Hz
Vert.	7323	AV	33.5	36.7	7.4	38.4	39.2	53.9	14.7	100	4	AV:1MHz/270Hz
Vert.	9764	AV	31.6	38.7	8.6	37.1	41.8	53.9	12.1	100	241	AV:1MHz/270Hz
Vert.	12205	AV	33.1	39.4	9.9	38	44.4	53.9	9.5	100	359	AV:1MHz/270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

Distance factor:                    13GHz-26.5GHz                    20log(3.0m/1.0m)= 9.5dB

## Radiated Emission

Test place                    UL Japan, Inc. Shonan EMC Lab.                    No.2 Semi Anechoic Chamber  
 Date                            November 28, 2011                                    December 3, 2011  
 Temperature / Humidity    25deg.C , 31%                                        20deg.C , 39%RH  
 Engineer                      Kenichi Adachi                                        Akira Sato  
 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.	74.176	QP	38.2	6.5	7.6	31.9	20.4	40	19.6	253	73	
Hori.	480.052	QP	45.6	18.2	8	31.6	40.2	46	5.8	100	352	
Hori.	604.485	QP	44.1	19.5	8.6	31.6	40.6	46	5.4	182	76	
Hori.	792.057	QP	38.3	22	9.5	31.4	38.4	46	7.6	151	61	
Hori.	1079.86	PK	45.8	23.9	12.4	38.9	43.2	73.9	30.7	100	20	
Hori.	1653.904	PK	46.9	25.2	13	38.4	46.7	73.9	27.2	100	226	
Hori.	2483.5	PK	48.6	27.5	13.6	37.6	52.1	73.9	21.8	104	51	
Hori.	4960	PK	47.2	31.6	5.9	36.5	48.2	73.9	25.7	137	189	
Hori.	7440	PK	45.7	37	7.3	38.4	51.6	73.9	22.3	100	169	
Hori.	9920	PK	43.8	39	8.6	37.2	54.2	73.9	19.7	100	10	
Hori.	12400	PK	45.7	39.5	9.9	38	57.1	73.9	16.8	100	34	
Hori.	1079.86	AV	32.4	23.9	12.4	38.9	29.8	53.9	24.1	100	20	AV:1MHz/10Hz
Hori.	1653.904	AV	40	25.2	13	38.4	39.8	53.9	14.1	100	226	AV:1MHz/10Hz
Hori.	2483.5	AV	39.2	27.5	13.6	37.6	42.7	53.9	11.2	104	51	AV:1MHz/270Hz
Hori.	4960	AV	37.9	31.6	5.9	36.5	38.9	53.9	15	137	189	AV:1MHz/270Hz
Hori.	7440	AV	35.4	37	7.3	38.4	41.3	53.9	12.6	100	169	AV:1MHz/270Hz
Hori.	9920	AV	32.8	39	8.6	37.2	43.2	53.9	10.7	100	10	AV:1MHz/270Hz
Hori.	12400	AV	34	39.5	9.9	38	45.4	53.9	8.5	100	34	AV:1MHz/270Hz
Vert.	58.345	QP	34.5	8.5	7.4	31.9	18.5	40	21.5	100	189	
Vert.	480.052	QP	38.6	18.2	8	31.6	33.2	46	12.8	121	195	
Vert.	598.468	QP	40.8	19.5	8.6	31.6	37.3	46	8.7	100	53	
Vert.	792.057	QP	34.9	22	9.5	31.4	35	46	11	100	358	
Vert.	1079.86	PK	52	23.9	12.4	38.9	49.4	73.9	24.5	100	39	
Vert.	1653.904	PK	48	25.2	13	38.4	47.8	73.9	26.1	100	91	
Vert.	2483.5	PK	46.3	27.5	13.6	37.6	49.8	73.9	24.1	100	201	
Vert.	4960	PK	45.4	31.6	5.9	36.5	46.4	73.9	27.5	100	45	
Vert.	7440	PK	45.1	37	7.3	38.4	51	73.9	22.9	100	109	
Vert.	9920	PK	44.5	39	8.6	37.2	54.9	73.9	19	100	332	
Vert.	12400	PK	45.2	39.5	9.9	38	56.6	73.9	17.3	100	23	
Vert.	1079.86	AV	38.2	23.9	12.4	38.9	35.6	53.9	18.3	100	39	AV:1MHz/10Hz
Vert.	1653.904	AV	40.9	25.2	13	38.4	40.7	53.9	13.2	100	91	AV:1MHz/10Hz
Vert.	2483.5	AV	35.4	27.5	13.6	37.6	38.9	53.9	15	100	201	AV:1MHz/270Hz
Vert.	4960	AV	33.9	31.6	5.9	36.5	34.9	53.9	19	100	45	AV:1MHz/270Hz
Vert.	7440	AV	33.4	37	7.3	38.4	39.3	53.9	14.6	100	109	AV:1MHz/270Hz
Vert.	9920	AV	31.1	39	8.6	37.2	41.5	53.9	12.4	100	332	AV:1MHz/270Hz
Vert.	12400	AV	33.5	39.5	9.9	38	44.9	53.9	9	100	23	AV:1MHz/270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB).

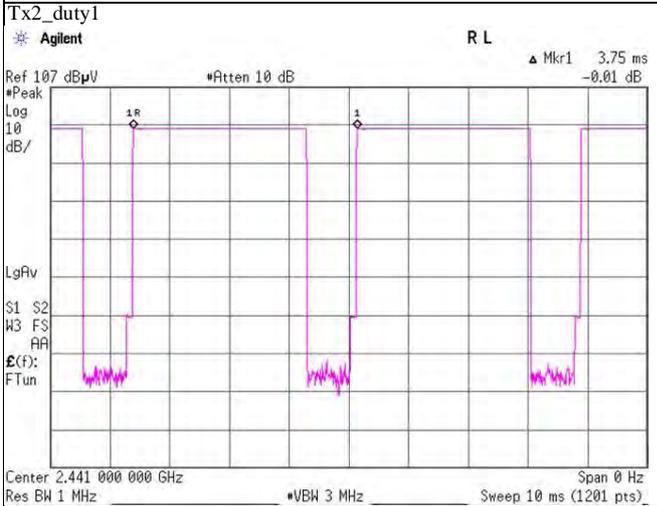
Distance factor:            13GHz-26.5GHz            20log(3.0m/1.0m)= 9.5dB

## VBW (Average) Calculation chart

**Tx, Bluetooth, BDR, PRBS9**

**VBW (Average) Calculation**

**VBW:  $1/x = 266.67\text{Hz} < 270\text{Hz}$   
x: (Tx on+Tx off) = 3.75ms**



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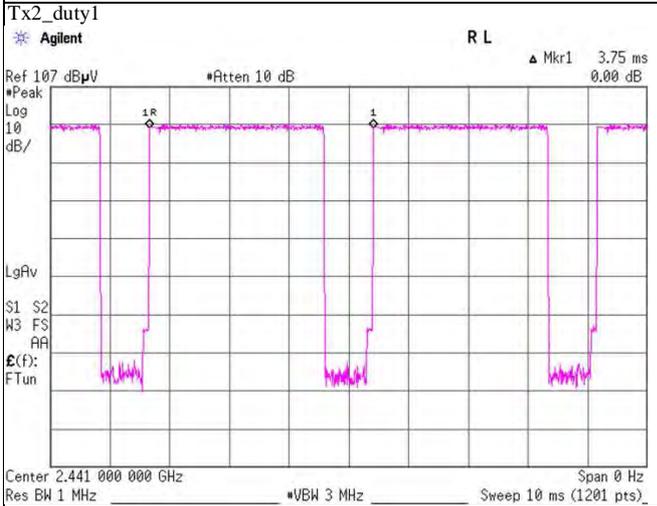
Facsimile : +81 463 50 6401

## VBW (Average) Calculation chart

**Tx, Bluetooth, EDR, PRBS9**

**VBW (Average) Calculation**

**VBW:  $1/x = 266.67\text{Hz} < 270\text{Hz}$   
x: (Tx on+Tx off) = 3.75ms**



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### Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (1/2)



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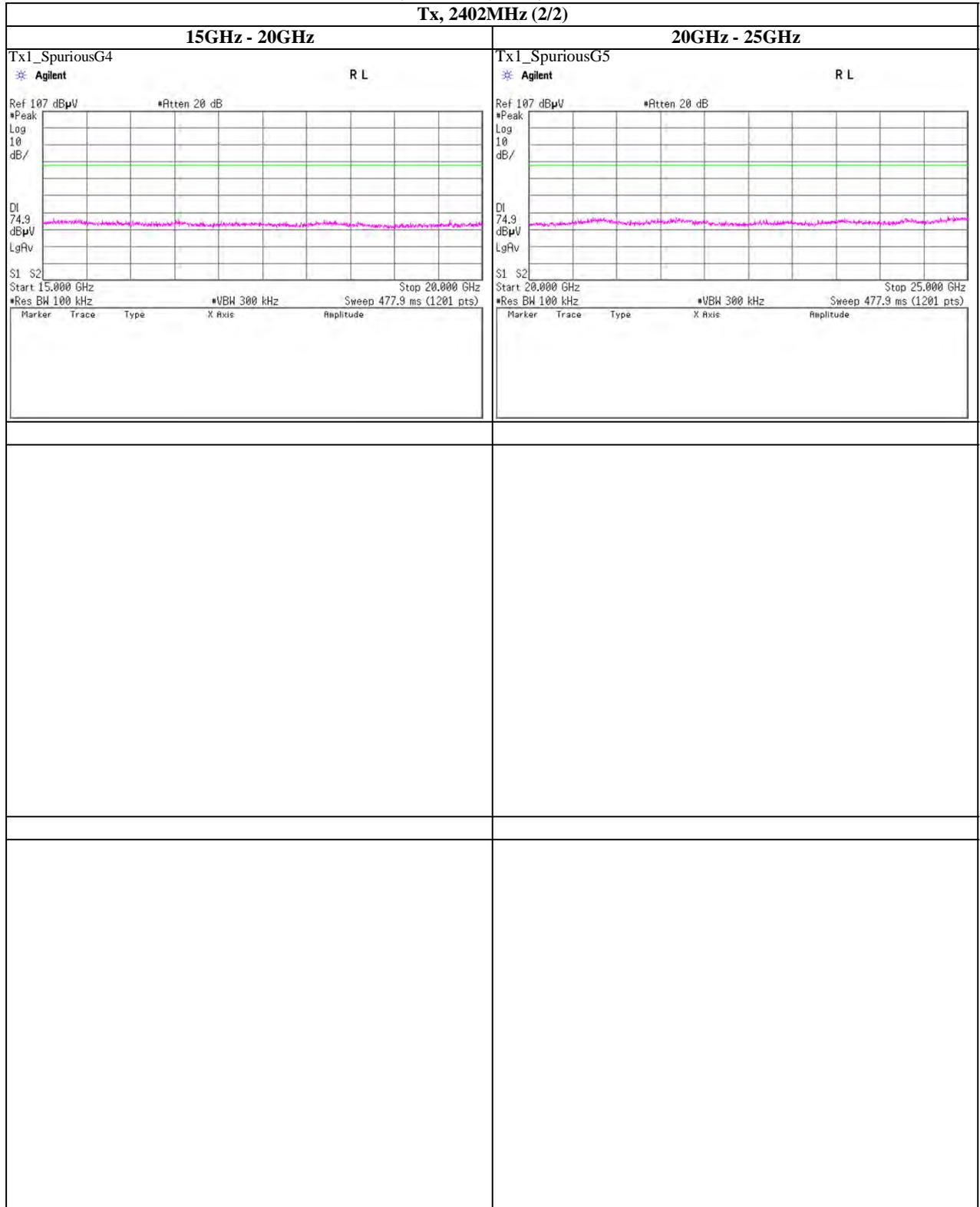
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### Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (2/2)



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### Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (1/2)



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### Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (2/2)



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### Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (1/2)



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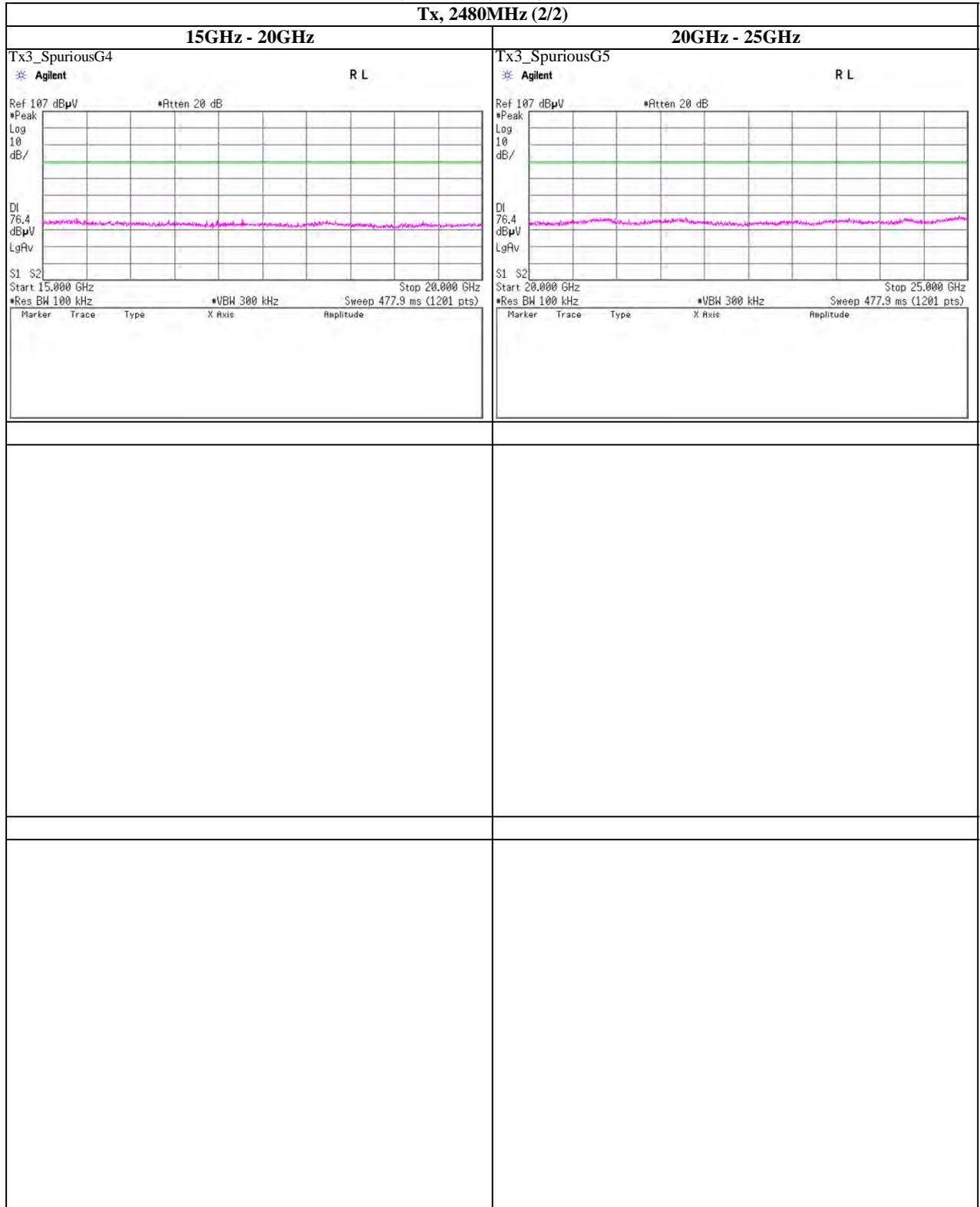
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (2/2)



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### Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (1/2)



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**Spurious emission (Conducted)**

**Tx, Bluetooth, EDR, PRBS9**

**Tx, 2402MHz (2/2)**



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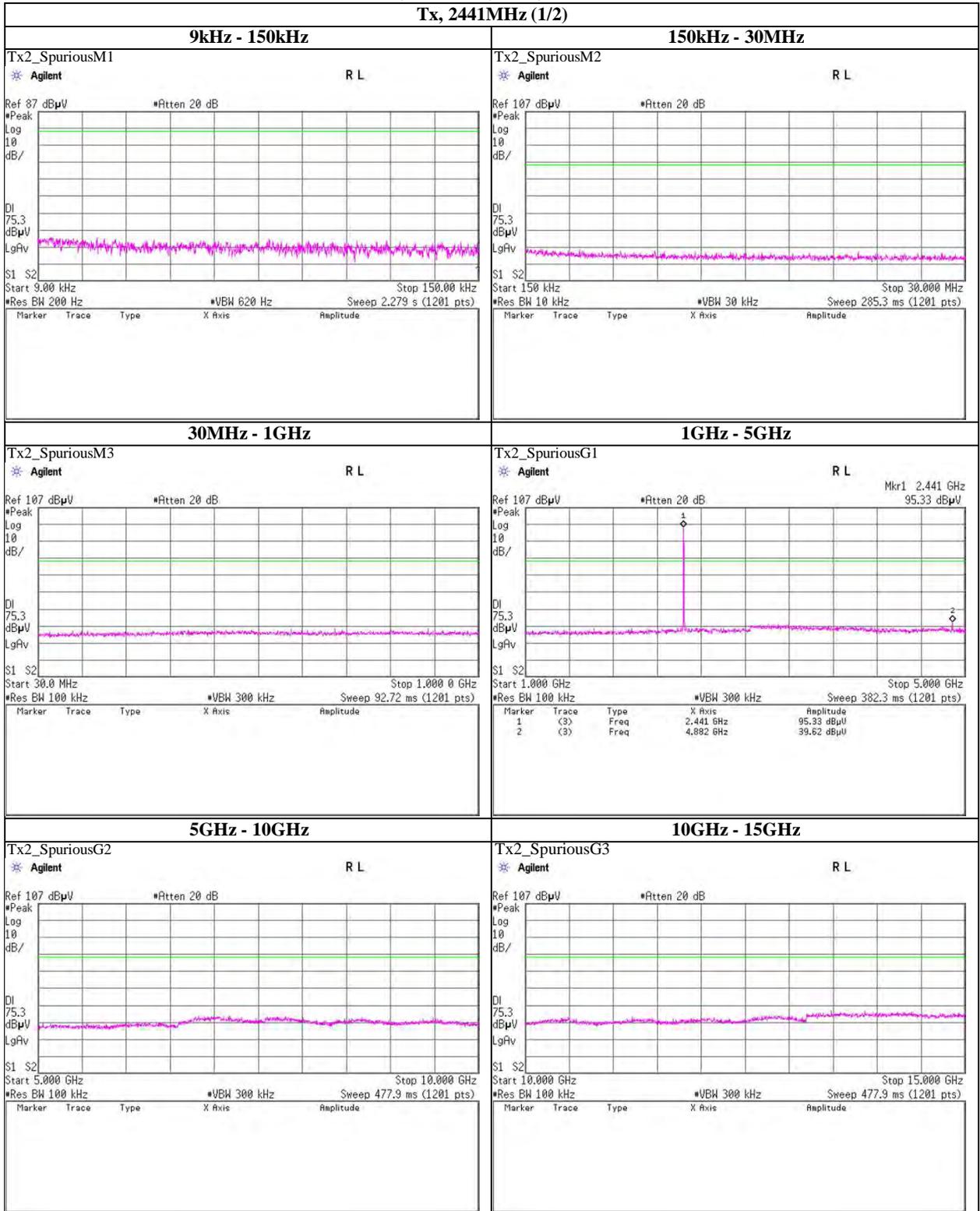
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Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (1/2)



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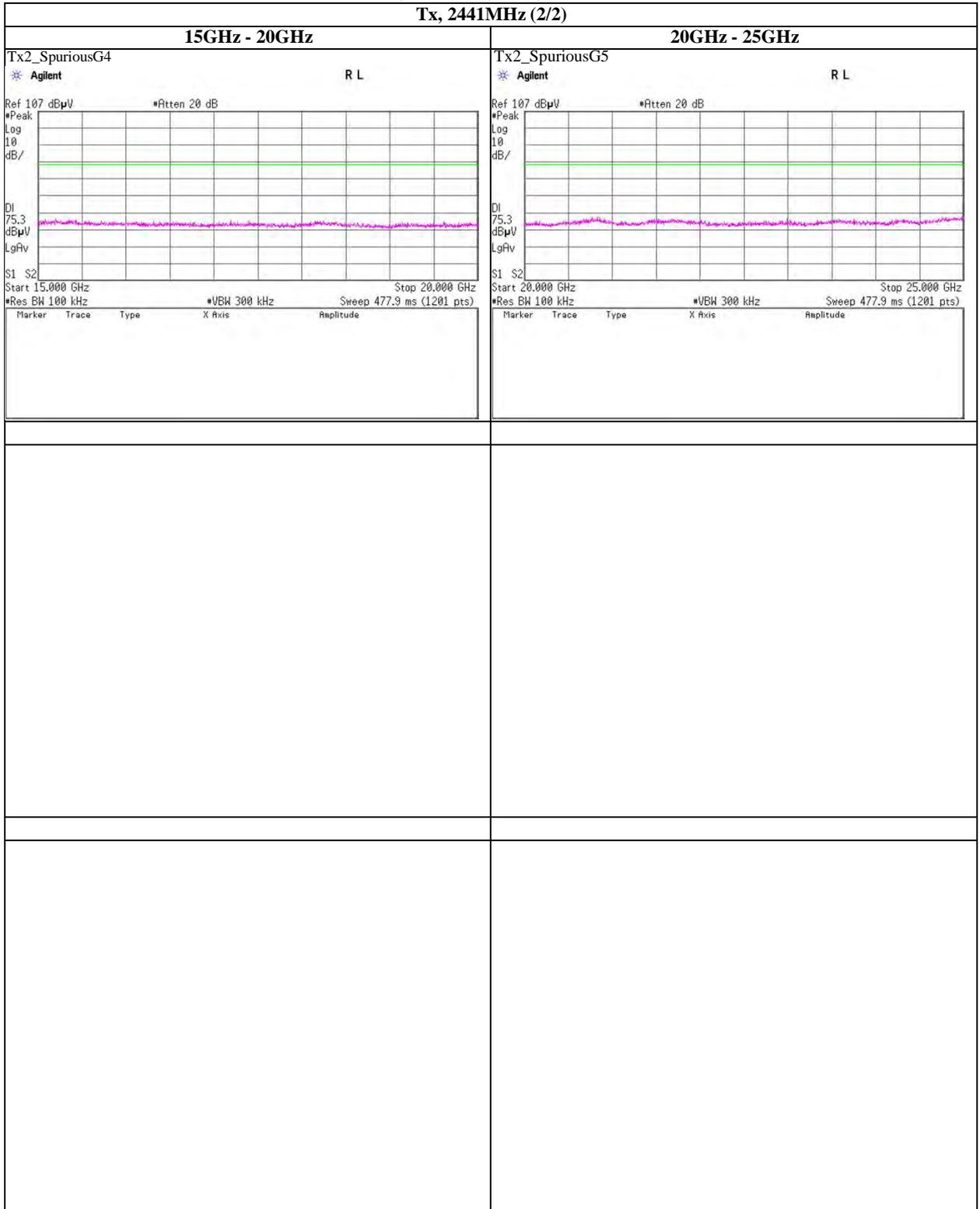
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**Spurious emission (Conducted)**

**Tx, Bluetooth, EDR, PRBS9**

**Tx, 2441MHz (2/2)**



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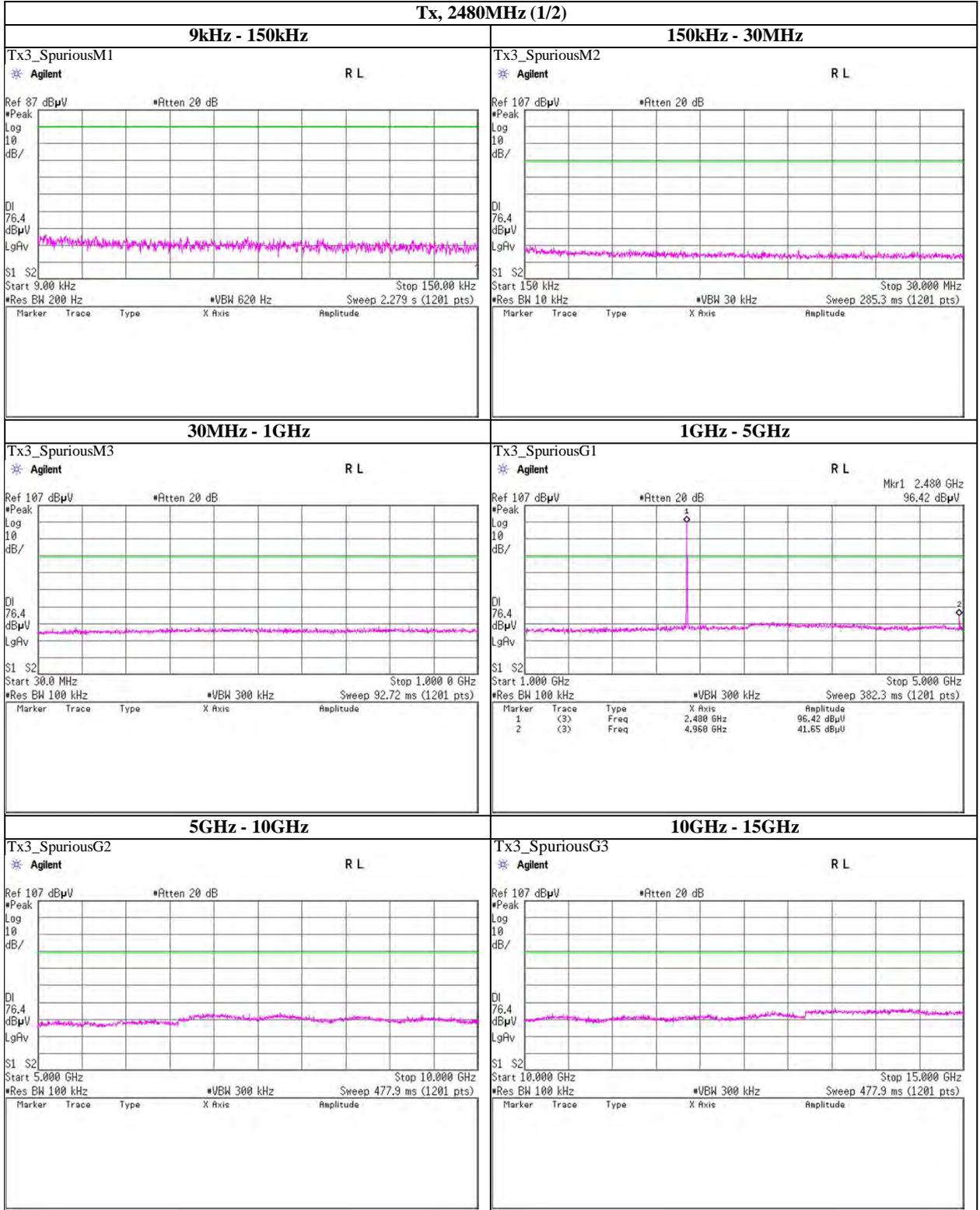
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Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (1/2)



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### Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

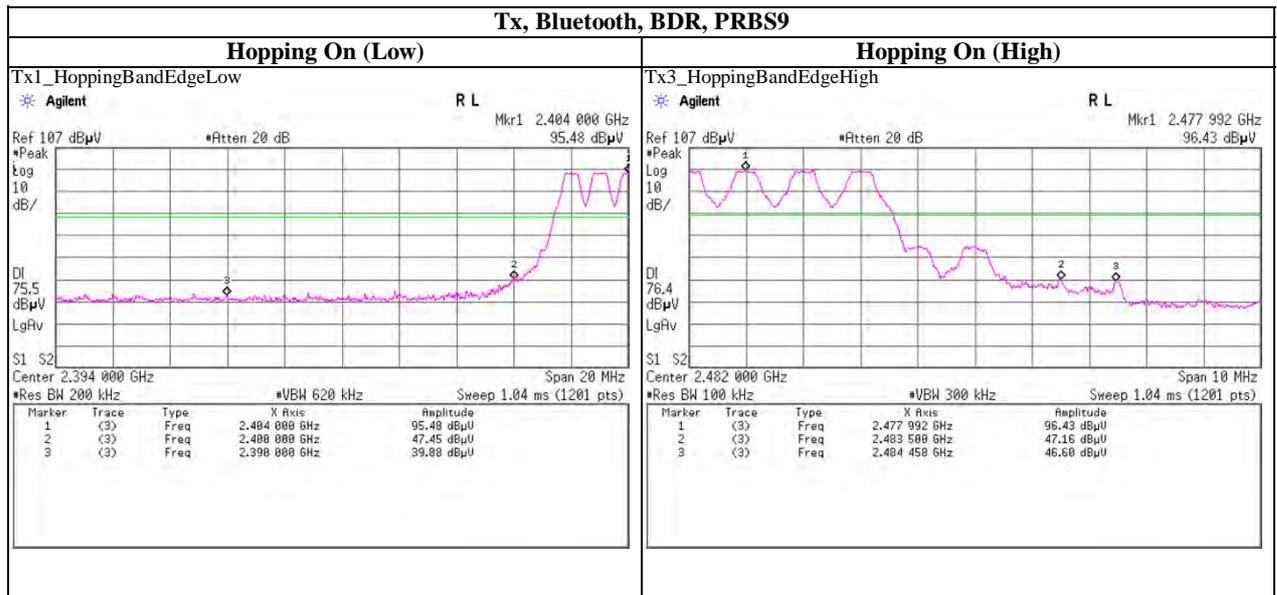
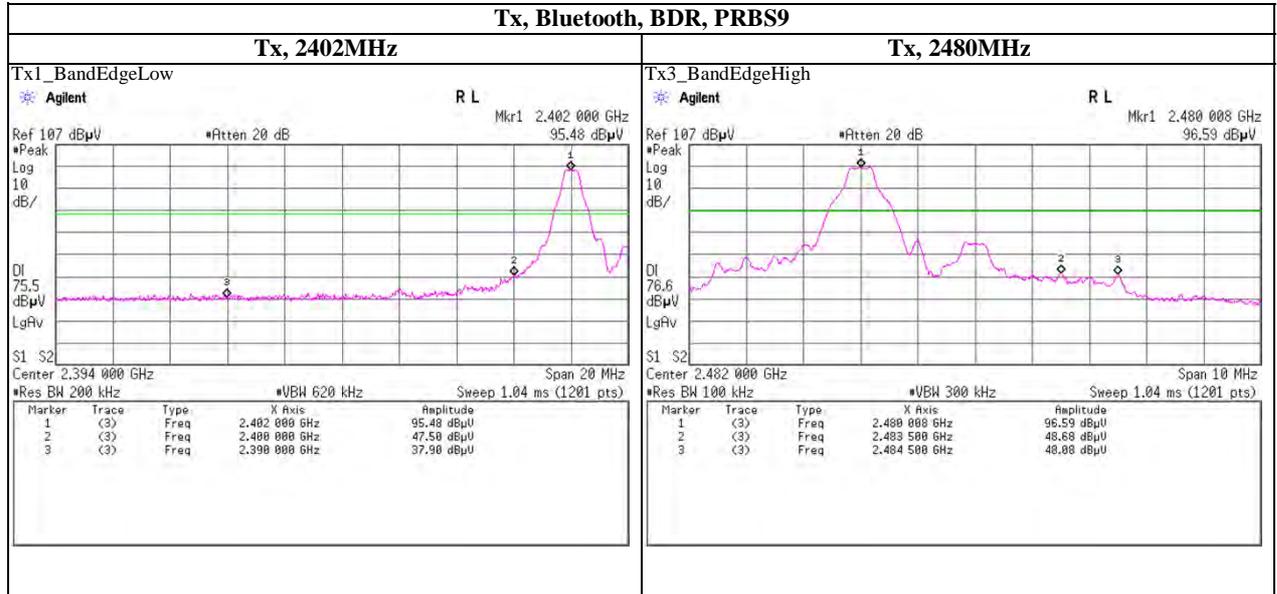
Tx, 2480MHz (2/2)



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## Spurious emission (Conducted)

### Band Edge compliance



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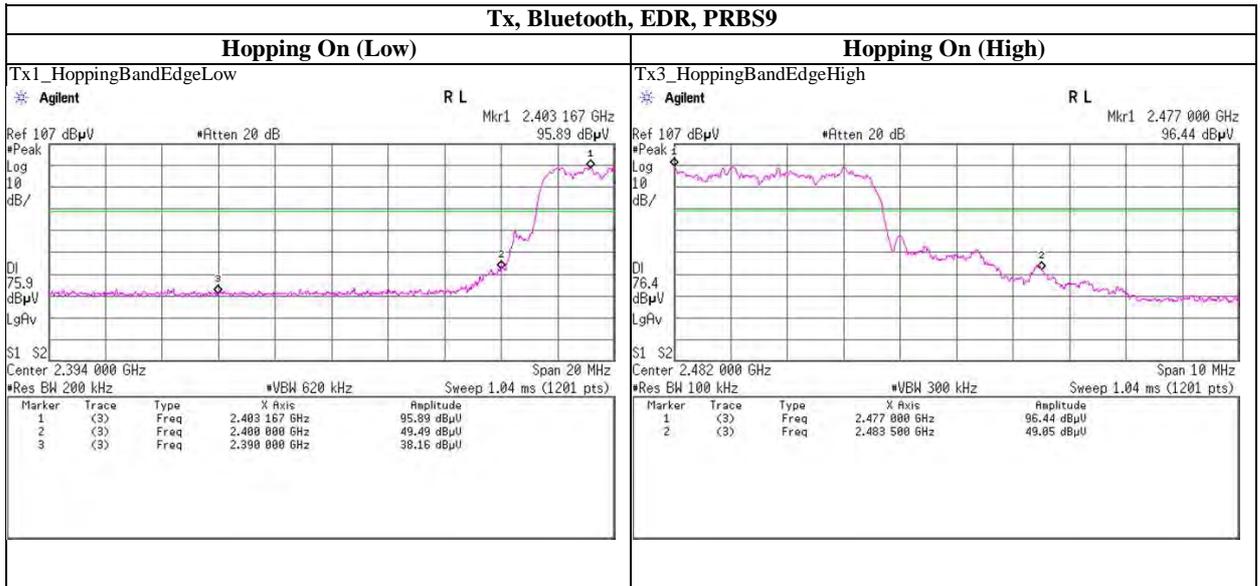
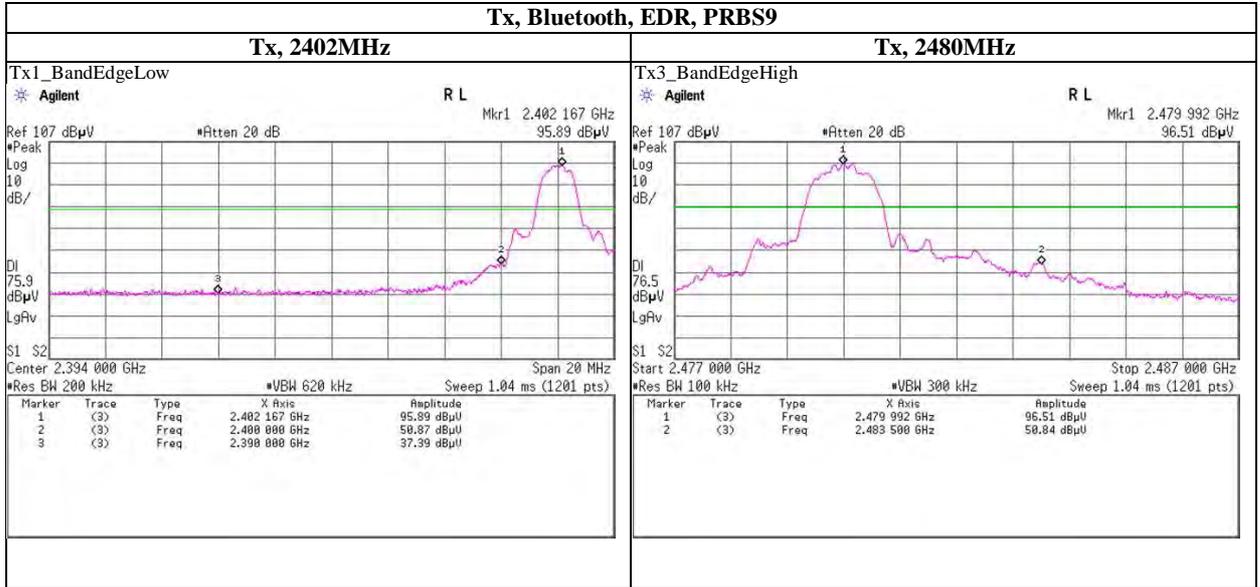
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## Spurious emission (Conducted)

### Band Edge compliance



**UL Japan, Inc.**

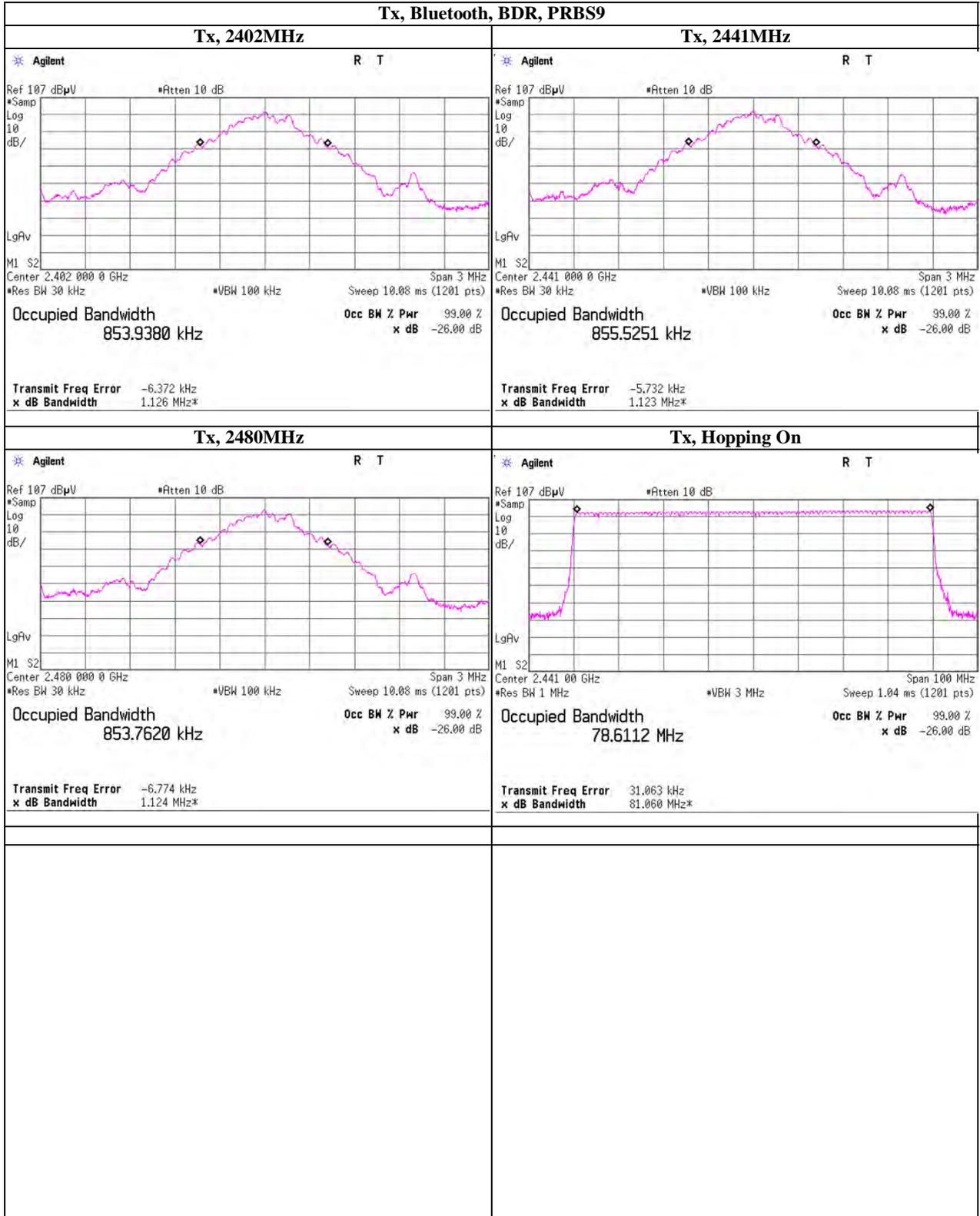
**Shonan EMC Lab.**

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### 99% Occupied Bandwidth



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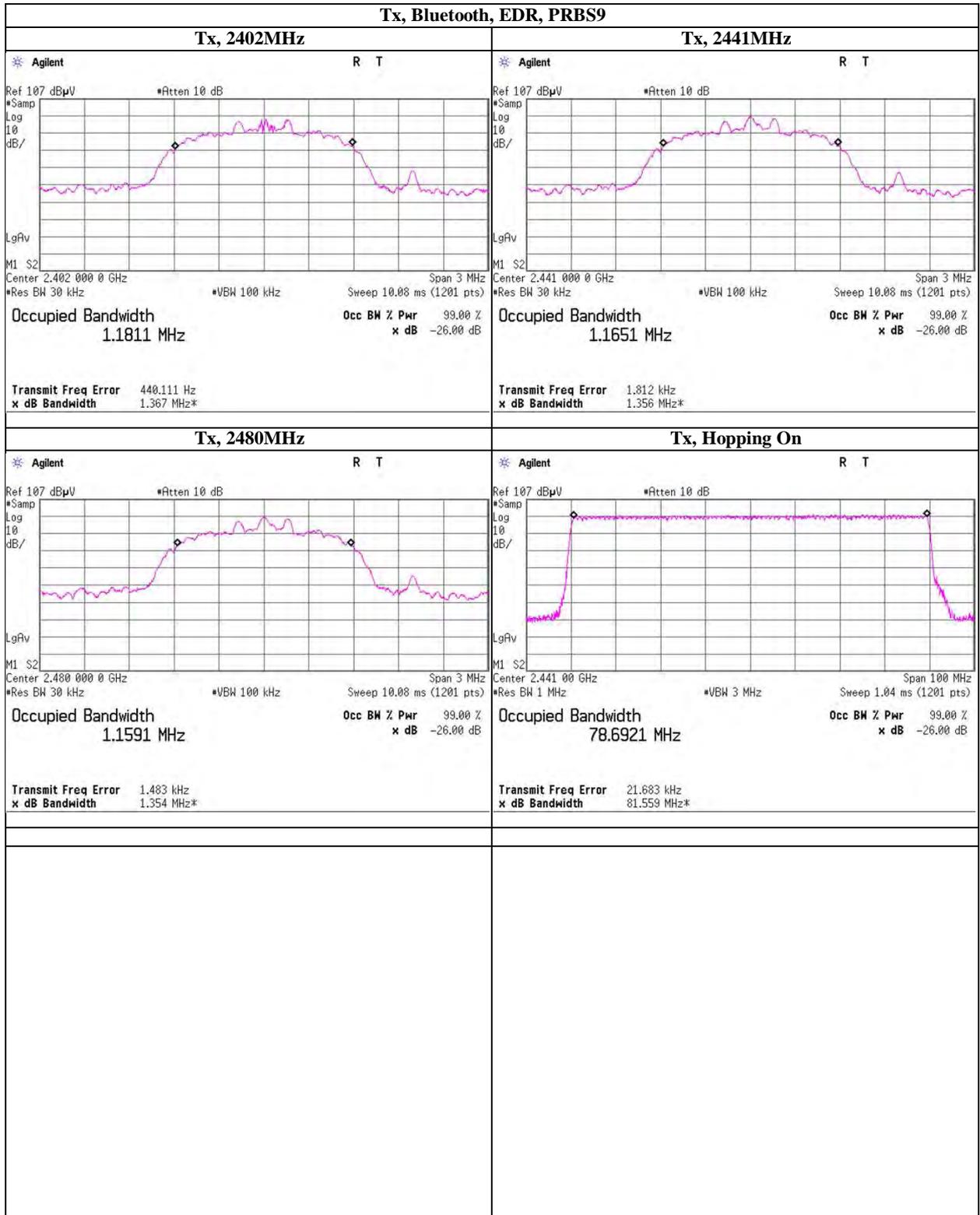
**Shonan EMC Lab.**

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## 99% Occupied Bandwidth



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**APPENDIX 2**  
**Test Instruments**

**EMI test equipment**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-02	Spectrum Analyzer	Agilent	E4448 A	MY48250106	AT,RE	2011/03/07 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2011/11/09 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2011/03/23 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2011/02/23 * 12
SPM-06	Power Meter	Anritsu	ML2495 A	0850009	AT	2011/04/12 * 12
SPSS-03	Power sensor	Anritsu	MA2411 B	0917063	AT	2011/04/12 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2011/02/17 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2011/02/17 * 12
SAT3-02	Attenuator	JFW	50HF-003N	-	RE	2011/02/17 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2011/11/16 * 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	2011/04/28 * 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	2011/04/28 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108 A	UHALP 9108-A 0893	RE	2011/11/16 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2011/02/23 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	RE	2011/08/04 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2011/09/25 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE	-
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE,AT	2011/03/23 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2011/03/16 * 12
SCC-G02	Coaxial Cable	Suhner	SUCOFLEX 104 A	46498/4 A	RE	2011/04/28 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2011/05/27 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104 A	46291/4 A	RE	2011/03/16 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2011/08/28 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2011/03/15 * 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 test