



RADIO TEST REPORT

Test Report No.: 32CE0340-SH-01-A

Applicant : **Kenwood Corporation**
Type of Equipment : **GPS NAVIGATION SYSTEM**
Model No. : **KW-NT500HDT**
FCC ID : **IOMKWNT500HDT**
Test regulation : **FCC Part15 Subpart C: 2011**
Test result : **Complied**

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3. This sample tested is in compliance with the limits of the above regulation.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: November 7 to 10, 2011

**Representative
test engineer:**

Hikaru Shirasawa
Engineer of WiSE Japan,
UL Verification Service

Approved by :

Go Ishiwata
Manager of WiSE Japan,
UL Verification Service

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13-EM-F0429

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SECTION 1: Customer information

Company Name : JVC KENWOOD Corporation
Address : 2967-3 Ishikawa-machi, Hachioji-shi, Tokyo, 192-8525 Japan
Telephone Number : +81 42-646-5525
Facsimile Number : +81 42-645-7023
Contact Person : Masayuki Ikeda

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

2.1 Identification of E.U.T.

Type of Equipment : GPS NAVIGATION SYSTEM
Model Number : KW-NT500HDT
Serial Number : Refer to clause 4.2
Rating : DC12V
Country of Mass-production : Indonesia
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : November 7, 2011
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: KW-NT500HDT (referred to as the EUT in this report) is a GPS NAVIGATION SYSTEM.

Clock frequency(ies) in the system : 32.768kHz/11.2896MHz/16MHz/26MHz/28.224MHz/32MHz
/33.333MHz/41.6MHz/48MHz

<Radio part>

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth / Channel spacing : 79MHz & 1MHz
Type of modulation : FHSS (GFSK, π 4DQPSK, 8DPSK)
Antenna type : PWB pattern
Antenna connector type : Coaxial
Antenna gain : 1.67dBi
ITU code : F1D, G1D
Operation temperature range : 0 to +40 deg.C.

FCC 15.31 (e)

The equipment provides the Bluetooth transmitter with stable power supply (DC3.3V), therefore, the equipment complies with the requirement.

FCC Part 15.203

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

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2011, final revised on July 8, 2011 and effective August 8, 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

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 Section 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 Section15.247 (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 Section15.247 (a)(1)	Conducted	N/A		Complied
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section15.247 (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 Section15.247 (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 Section15.247 (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 Section15.247 (d) Section15.209	Conducted/ Radiated	N/A		5.1dB ----- (75.436MHz, QP, Horizontal, Tx 2402MHz, DH5) ----- (64.160MHz, QP, 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 -		Complied

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	4.9 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
Radiated emission (Measurement distance: 1m)	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 test report has enough margin, more than site margin.

Antenna port conducted test

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

Spurious emission (Conducted), Power density Measurement (below 1GHz) uncertainty for this test was: (±) 1.8dB

Spurious emission (Conducted), Power density Measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Spurious emission (Conducted), Power density Measurement (3G-18GHz) uncertainty for this test was: (±) 3.6dB

Spurious emission (Conducted), Power density 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 checked="" type="checkbox"/> No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 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.

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

** The EUT has no Inquiry mode.

*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.=0, Int.=63
EDR: Ext.=0, Int.=127

Software: CSR BlueSuite BlueTest Version 1.24

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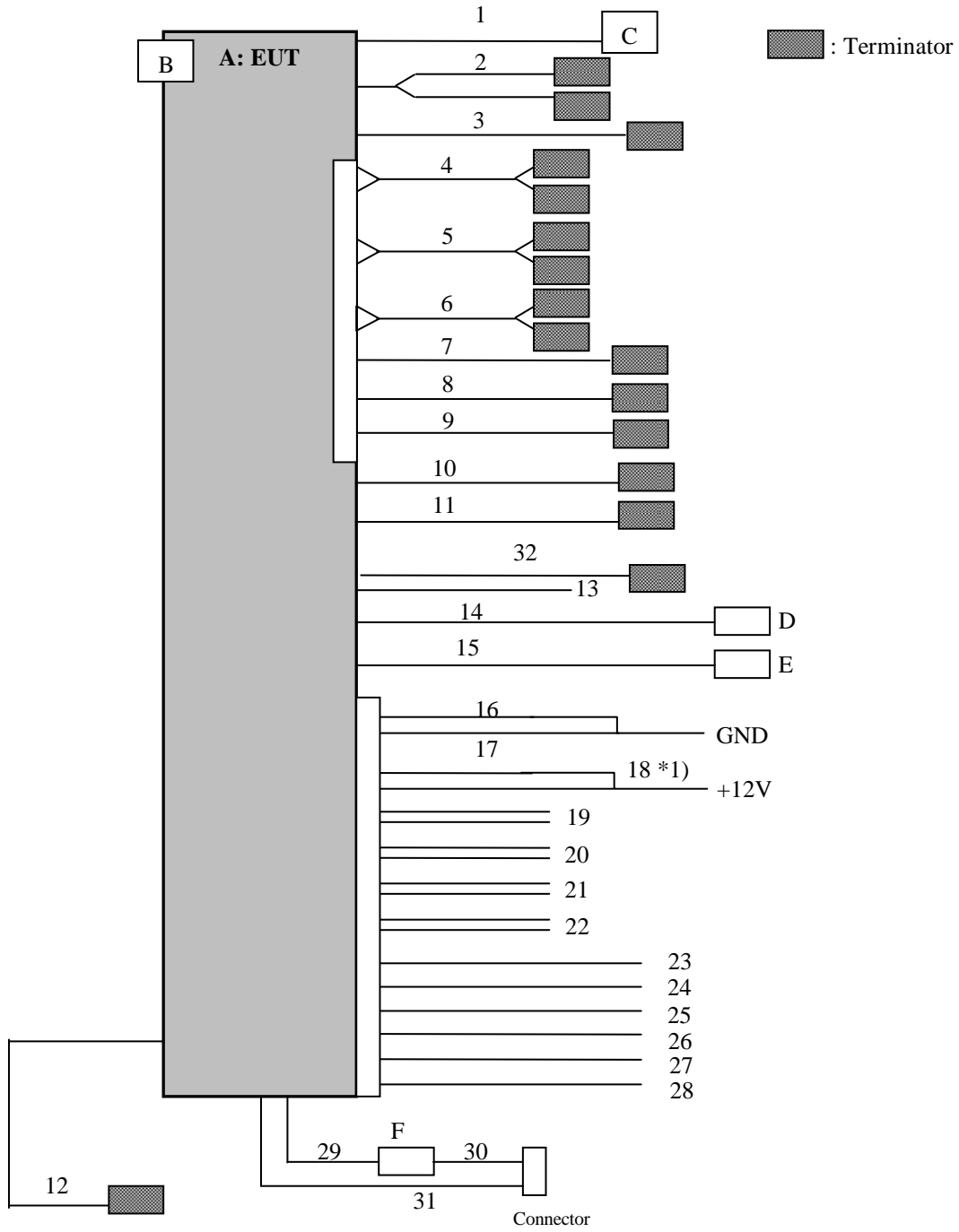
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4.2 Configuration and peripherals



* 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	GPS Navigation System	KW-NT500HDT	*2)	KENWOOD	EUT
B	Micro SDHC	RMSD-BS04GSA	E304G1041	BUFFALO	-
C	Microphone	-	-	KENWOOD	-
D	GPS antenna	-	-	KENWOOD	-
E	USB memory	USM4GL-W	-	Sony	-
F	Jig	-	-	KENWOOD	-

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

*2) Radiated emissions: 156X0002, Antenna port conducted tests: 156X0005

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	Microphone	3.0	Shielded	Unshielded	-
2	Subwoofer (OUT)	0.15+1.5	Unshielded	Unshielded	-
3	Steering Wheel Remote	0.2+1.8	Unshielded	Unshielded	-
4	Audio (Front OUT)	0.1+0.9	Unshielded	Unshielded	-
5	Audio (Rear OUT)	0.1+0.8	Unshielded	Unshielded	-
6	LINE IN	0.2+0.9	Unshielded	Unshielded	-
7	Video OUT	0.15+3.6	Unshielded	Unshielded	-
8	Video IN	0.2+1.5	Unshielded	Unshielded	-
9	Camera IN	0.2+1.5	Unshielded	Unshielded	-
10	Antenna	1.0	Shielded	Shielded	-
11	iPod VIDEO	1.5	Unshielded	Unshielded	-
12	AUX	1.0	Unshielded	Unshielded	-
13	SXM	1.0	Shielded	Shielded	-
14	GPS Antenna	5.0	Shielded	Unshielded	-
15	iPod / USB	1.0+2.0	Shielded	Shielded	-
16	Ground	1.5	Unshielded	Unshielded	-
17	PPK SW	2.0	Unshielded	Unshielded	-
18	DC+	1.5	Unshielded	Unshielded	-
19	Speaker (1)	1.1	Unshielded	Unshielded	-
20	Speaker (2)	1.1	Unshielded	Unshielded	-
21	Speaker (3)	1.1	Unshielded	Unshielded	-
22	Speaker (4)	1.1	Unshielded	Unshielded	-
23	P. CONT	0.1	Unshielded	Unshielded	-
24	Steering Wheel Remote INPUT	0.1	Unshielded	Unshielded	-
25	Antenna CONT	0.1	Unshielded	Unshielded	-
26	MUTE	0.1	Unshielded	Unshielded	-
27	Illumination	0.1	Unshielded	Unshielded	-
28	Reverse Gear Signal	5.0	Unshielded	Unshielded	-
29	Jig-1	0.1	Unshielded	Unshielded	-
30	Jig-2	0.05	Unshielded	Unshielded	-
31	Jig-3	0.15	Unshielded	Unshielded	-
32	DIRECT S.R.	1.5	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.1 / No.3 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, 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 26GHz
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	1000-26000MHz	
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).

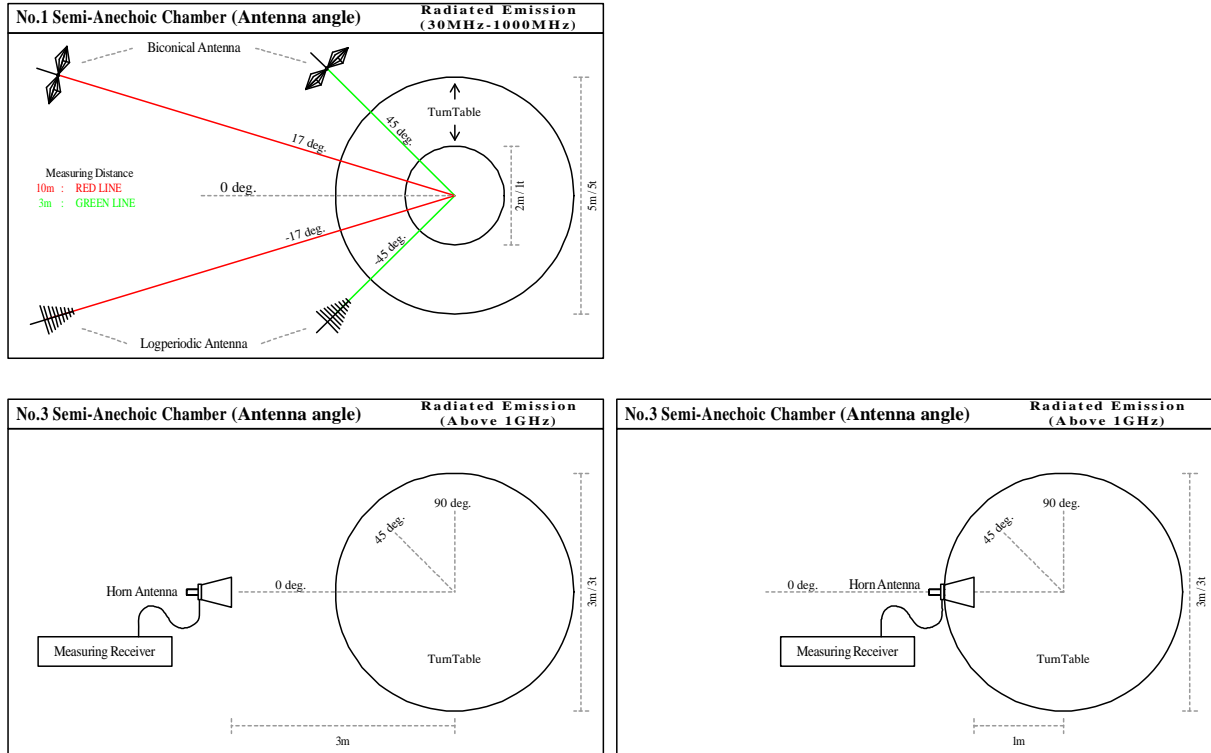
* When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

The EUT was tested in the direction normally used.

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Figure 1. Antenna angle



5.5 Band edge

Band edge level at 2400MHz is less than 20dB of peak point of the carrier. Refer to the data of Out of Band Emissions (Antenna Port Conducted). Band edge level at 2390MHz 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 5th order harmonics.
Refer to APPENDIX 2

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 2

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 2

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 2

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 2

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 2

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 2

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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 9, 2011
 Temperature / Humidity 27deg.C , 35%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	0.925	1.000	>= 0.617
DH5	2441.0	0.933	1.003	>= 0.622
DH5	2480.0	0.935	1.003	>= 0.623

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

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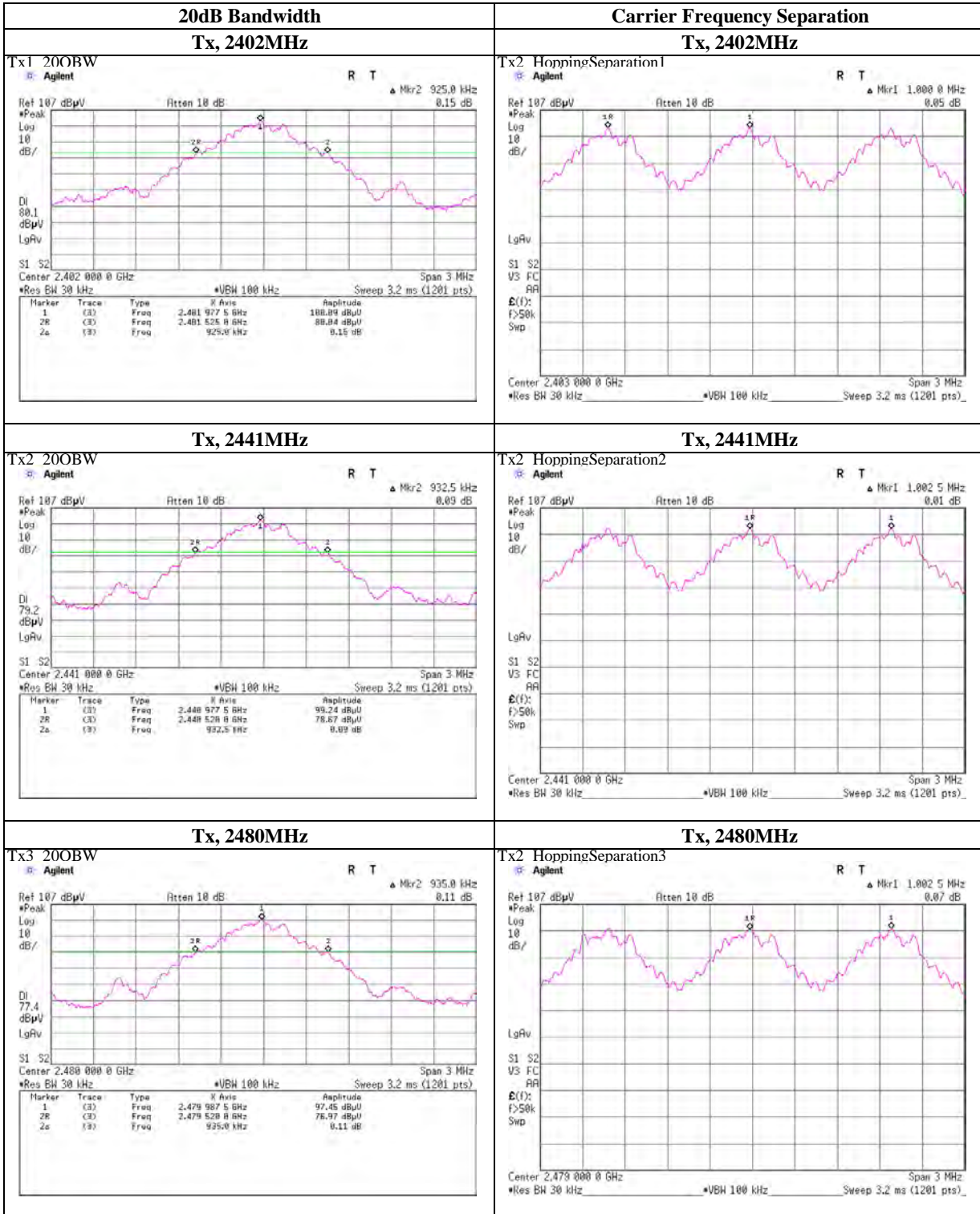
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9



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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date November 9, 2011
 Temperature / Humidity 27deg.C , 35%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	1.280	1.003	>= 0.853
3-DH5	2441.0	1.260	1.003	>= 0.840
3-DH5	2480.0	1.263	1.000	>= 0.842

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

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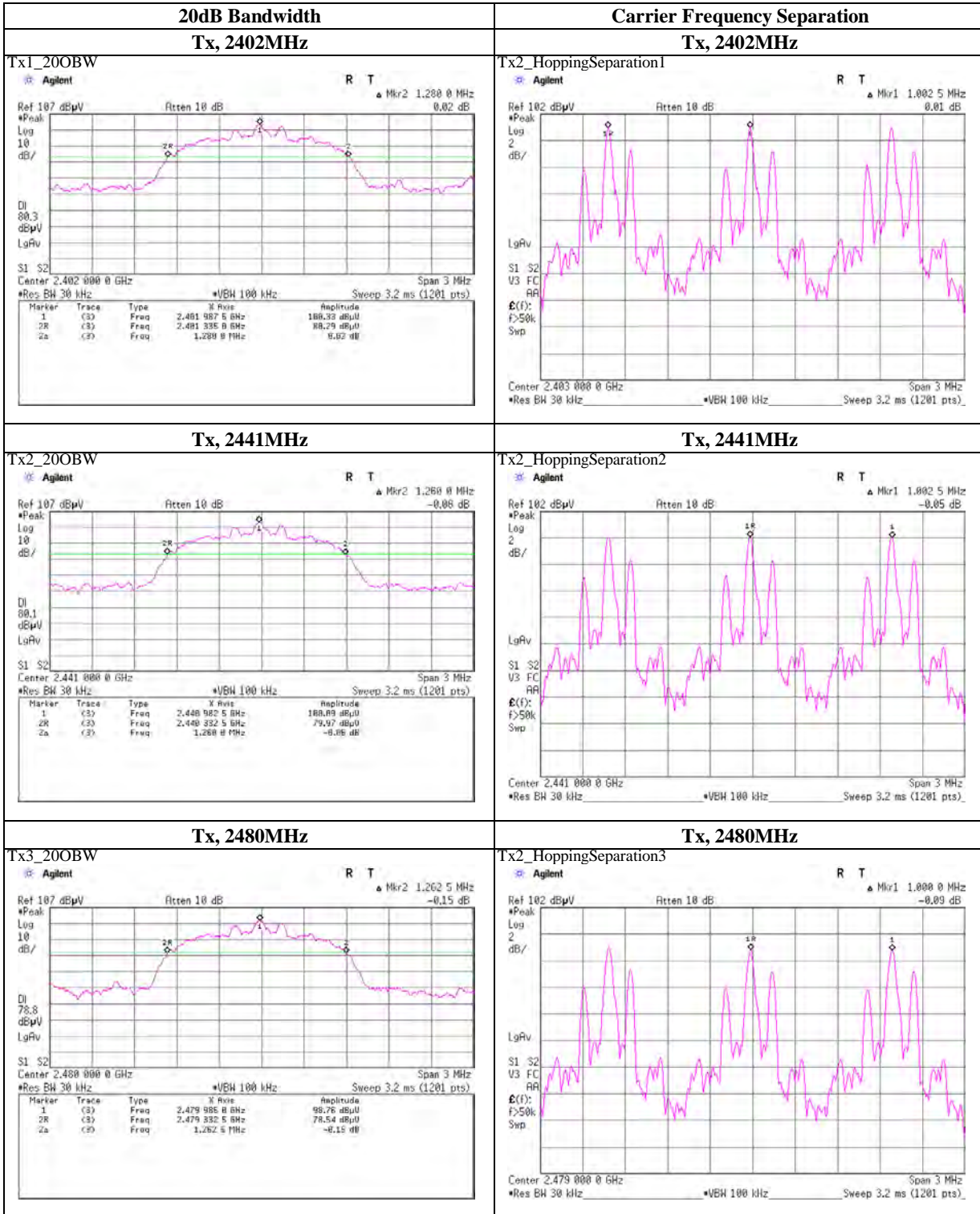
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



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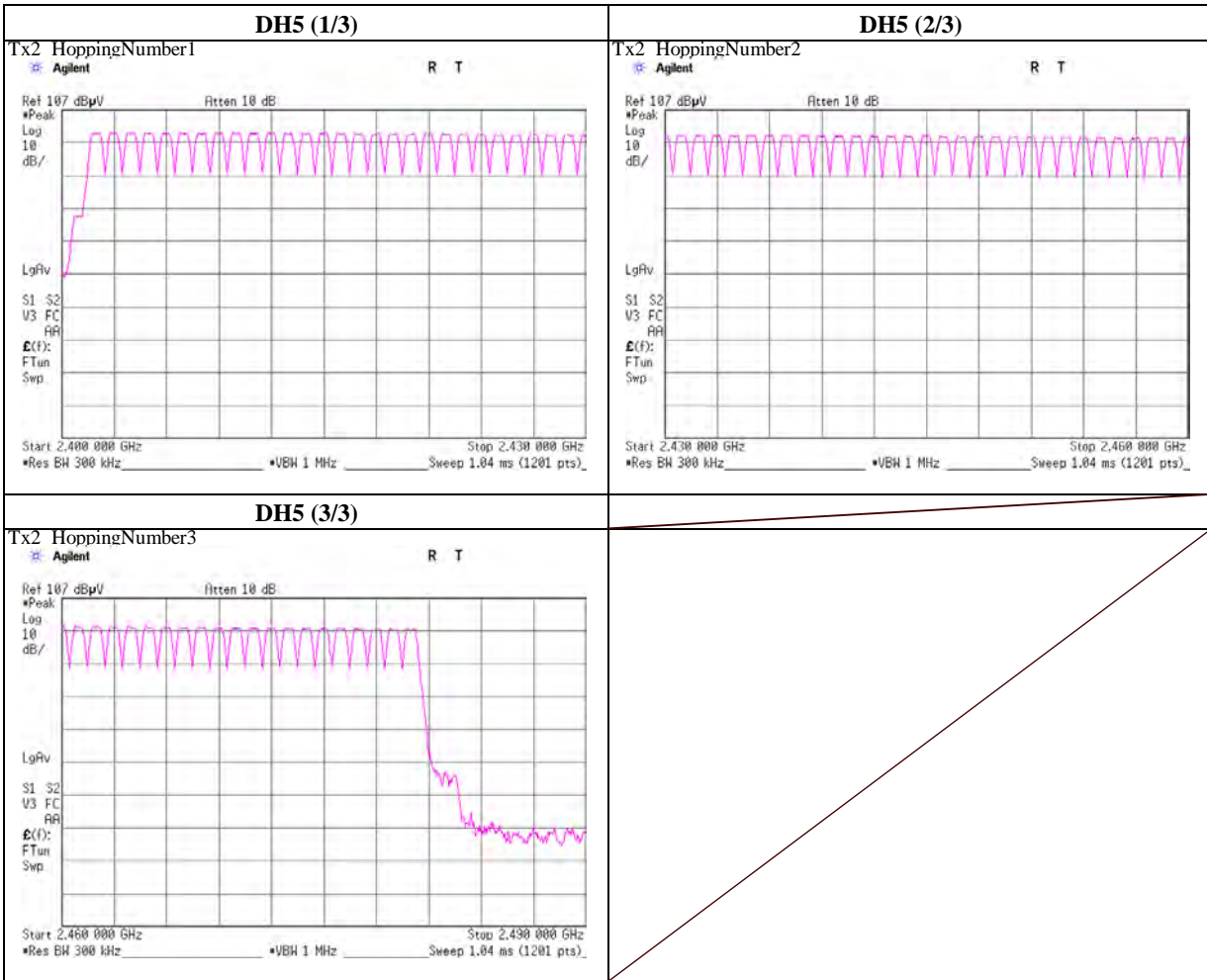
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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.
Date	November 9, 2011
Temperature / Humidity	27deg.C , 35%RH
Engineer	Hikaru Shirasawa
Mode	Tx, Bluetooth, BDR, PRBS9

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



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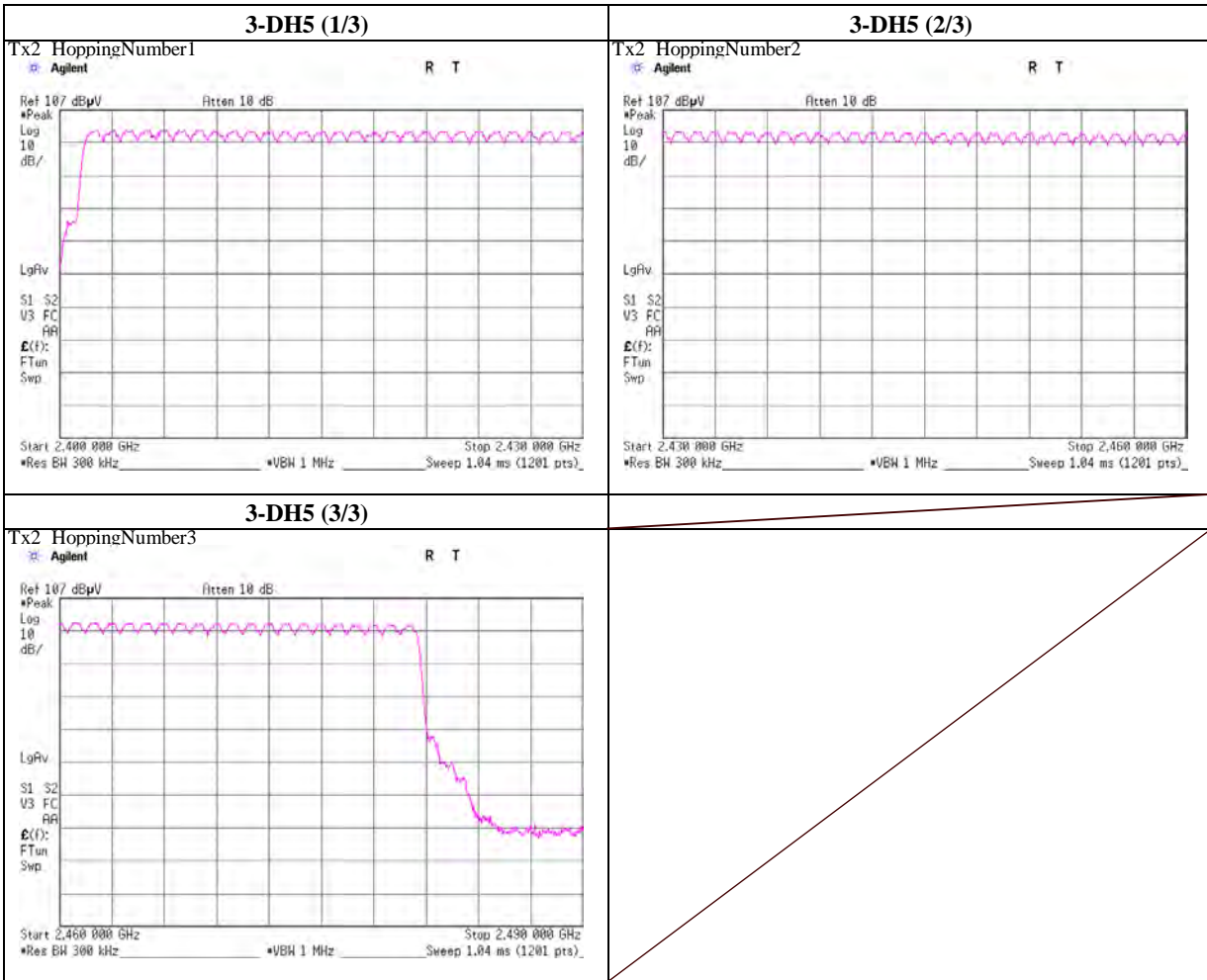
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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.
Date	November 9, 2011
Temperature / Humidity	27deg.C , 35%RH
Engineer	Hikaru Shirasawa
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 November 9, 2011
 Temperature / Humidity 27deg.C , 35%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	50.6	/ 5.0 sec.	x 31.6 sec. = 320 times	0.408	131	400
DH3	25.6	/ 5.0 sec.	x 31.6 sec. = 162 times	1.665	270	400
DH5	17.0	/ 5.0 sec.	x 31.6 sec. = 108 times	2.917	315	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	51	51	50	50	51	50.6
DH3	26	26	26	25	25	25.6
DH5	17	17	17	17	17	17.0

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

UL Japan, Inc.

Shonan EMC Lab.

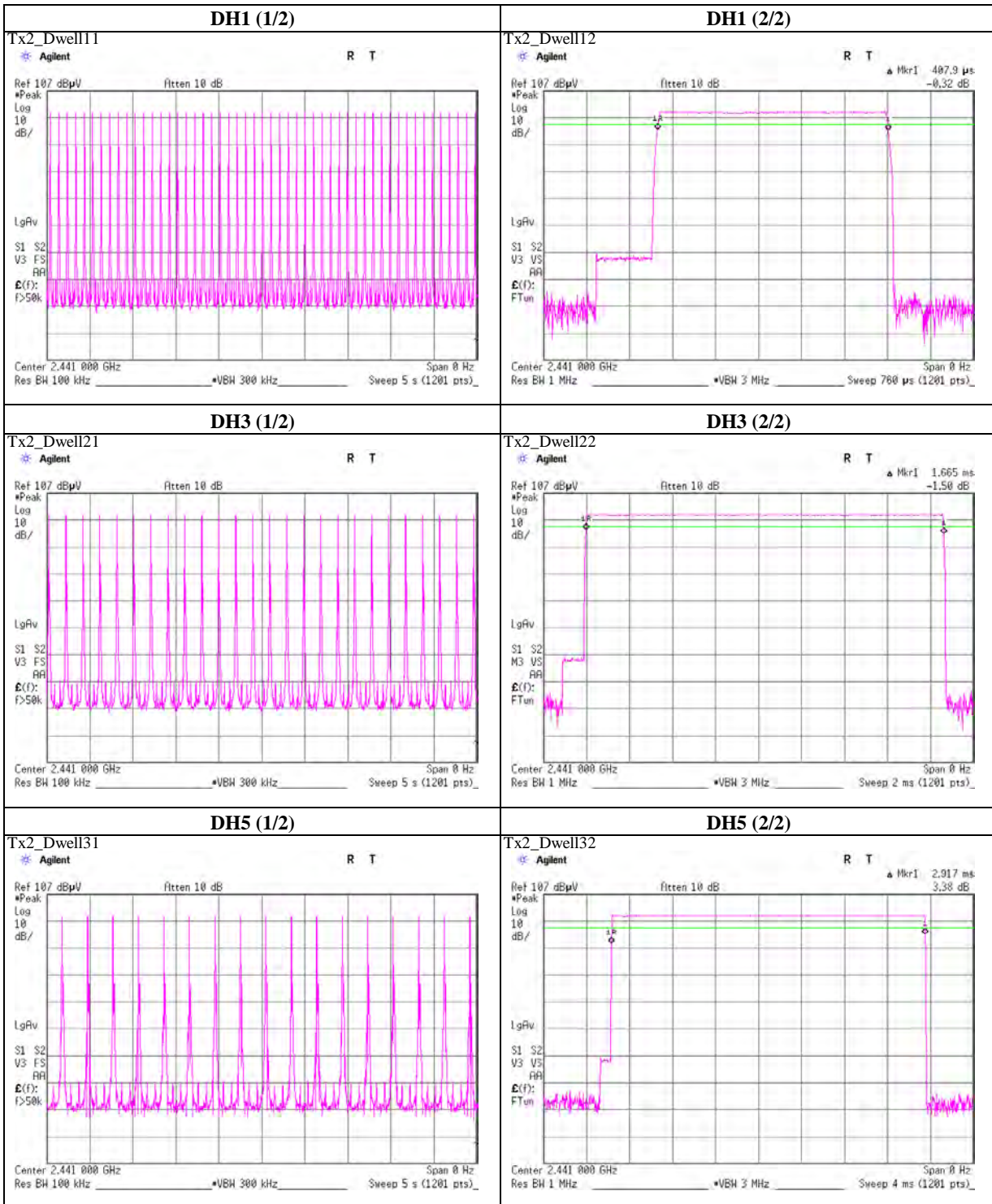
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Dwell time

Tx, Bluetooth, BDR, PRBS9



UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date November 9, 2011
 Temperature / Humidity 27deg.C , 35%RH
 Engineer Hikaru Shirasawa
 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	50.6	/ 5.0 sec. x 31.6 sec. = 320 times	0.422	135	400
3-DH3	25.4	/ 5.0 sec. x 31.6 sec. = 161 times	1.672	269	400
3-DH5	17.0	/ 5.0 sec. x 31.6 sec. = 108 times	2.927	316	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	
3-DH1	51	51	50	50	51	50.6
3-DH3	26	25	25	25	26	25.4
3-DH5	17	17	17	17	17	17.0

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

UL Japan, Inc.

Shonan EMC Lab.

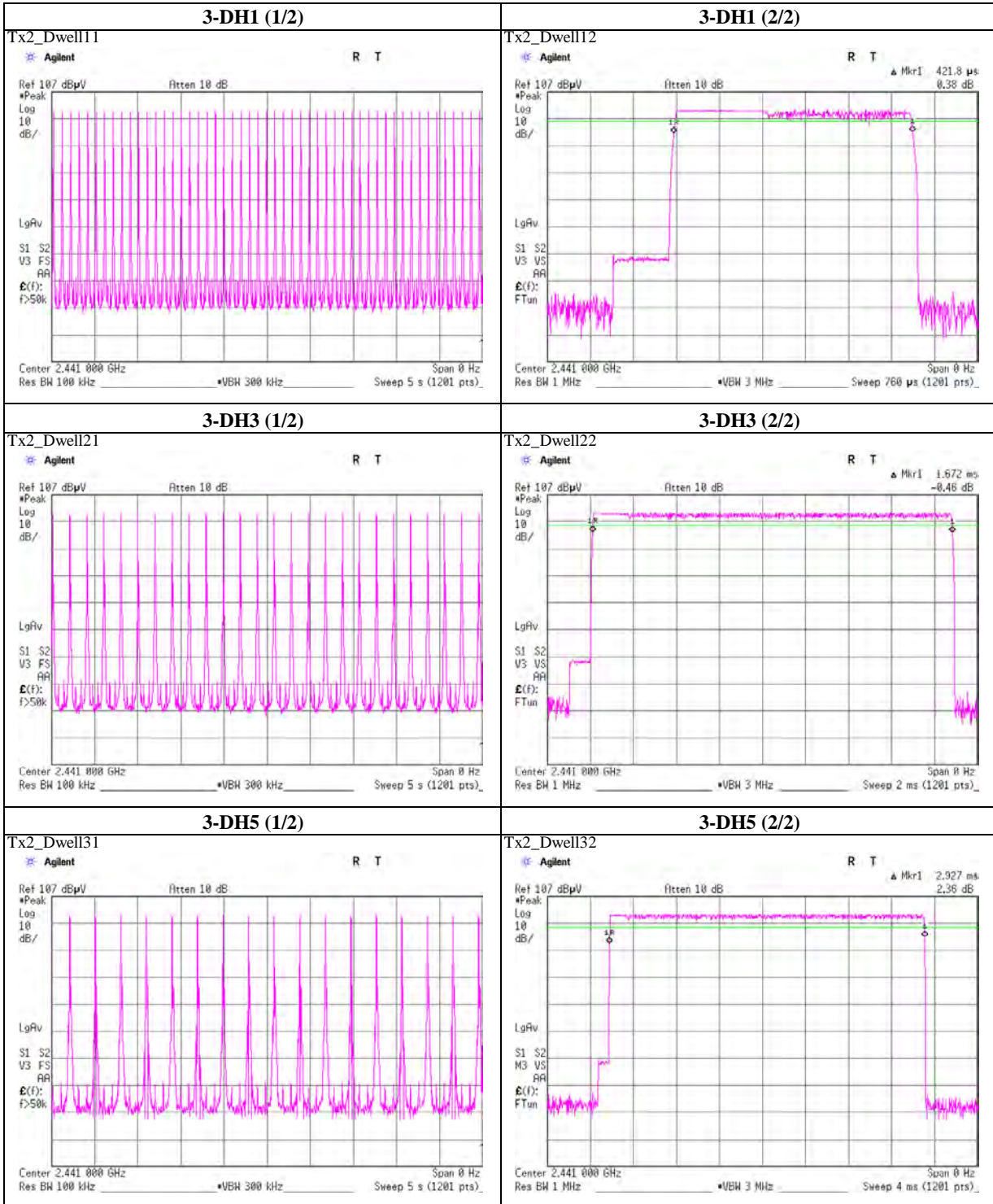
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Dwell time

Tx, Bluetooth, EDR, PRBS9



UL Japan, Inc.

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Peak Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date November 10, 2011
 Temperature / Humidity 24deg.C , 39%RH
 Engineer Hikaru Shirasawa
 Mode Tx, Bluetooth, BDR (Worst: DH5)

(* 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	-6.44	2.01	9.97	5.54	3.58	20.97	125	15.42
DH5	2441.0	-7.39	2.03	9.97	4.61	2.89	20.97	125	16.35
DH5	2480.0	-8.72	2.05	9.97	3.30	2.14	20.97	125	17.66
2-DH5	2402.0	-5.36	2.01	9.97	6.62	4.60	20.97	125	14.34
2-DH5	2441.0	-6.04	2.03	9.97	5.96	3.95	20.97	125	15.00
2-DH5	2480.0	-7.13	2.05	9.97	4.89	3.09	20.97	125	16.07
3-DH5	2402.0	-5.15	2.01	9.97	6.83	4.82	20.97	125	14.13
3-DH5	2441.0	-5.89	2.03	9.97	6.11	4.09	20.97	125	14.85
3-DH5	2480.0	-6.91	2.05	9.97	5.11	3.25	20.97	125	15.85

Sample Calculation:

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

UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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 Facsimile : +81 463 50 6401

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 & No.3 Semi Anechoic Chamber
 Date November 7, 2011 November 8, 2011
 Temperature / Humidity 22deg.C , 51%RH 23deg.C , 53%RH
 Engineer Takahiro Suzuki Takahiro Suzuki
 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.	75.436	QP	52.7	6.4	7.6	31.8	34.9	40.0	5.1	260	122	
Hori.	83.776	QP	51.1	7.1	7.7	31.8	34.1	40.0	5.9	228	113	
Hori.	203.036	QP	41.5	16.4	9.0	31.7	35.2	43.5	8.3	160	15	
Hori.	212.030	QP	39.9	16.5	9.1	31.7	33.8	43.5	9.7	141	13	
Hori.	360.507	QP	47.3	15.4	7.2	31.8	38.1	46.0	7.9	100	303	
Hori.	2390.000	PK	48.6	27.2	13.8	41.1	48.5	73.9	25.4	100	133	
Hori.	2400.000	PK	58.6	27.3	13.8	41.1	58.6	73.9	15.3	100	133	
Hori.	3203.982	PK	47.2	29.0	5.5	41.5	40.2	73.9	33.7	100	0	
Hori.	4007.000	PK	44.2	30.0	5.7	41.7	38.2	73.9	35.7	100	0	
Hori.	4090.400	PK	55.6	30.1	5.7	41.7	49.7	73.9	24.2	100	103	
Hori.	4804.000	PK	52.0	31.1	6.0	41.1	48.0	73.9	25.9	100	152	
Hori.	7206.000	PK	46.1	36.5	7.4	41.3	48.7	73.9	25.2	100	0	
Hori.	9608.000	PK	45.2	38.2	8.7	38.8	53.3	73.9	20.6	100	0	
Hori.	12010.000	PK	45.4	39.3	10.2	39.2	55.7	73.9	18.2	100	0	
Hori.	2390.000	AV	35.6	27.2	13.8	41.1	35.5	53.9	18.4	100	133	VBW:270Hz
Hori.	2400.000	AV	45.0	27.3	13.8	41.1	45.0	53.9	8.9	100	133	VBW:270Hz
Hori.	3203.982	AV	36.0	29.0	5.5	41.5	29.0	53.9	24.9	100	0	Not Detected(VBW:10Hz)
Hori.	4007.000	AV	34.8	30.0	5.7	41.7	28.8	53.9	25.1	100	0	Not Detected(VBW:10Hz)
Hori.	4090.400	AV	49.1	30.1	5.7	41.7	43.2	53.9	10.7	100	103	Not Detected(VBW:10Hz)
Hori.	4804.000	AV	46.0	31.1	6.0	41.1	42.0	53.9	11.9	100	152	VBW:270Hz
Hori.	7206.000	AV	36.8	36.5	7.4	41.3	39.4	53.9	14.5	100	0	VBW:270Hz
Hori.	9608.000	AV	34.8	38.2	8.7	38.8	42.9	53.9	11.0	100	0	VBW:270Hz
Hori.	12010.000	AV	36.1	39.3	10.2	39.2	46.4	53.9	7.5	100	0	VBW:270Hz
Vert.	64.290	QP	51.2	7.3	7.5	31.8	34.2	40.0	5.8	100	14	
Vert.	76.494	QP	48.8	6.4	7.6	31.8	31.0	40.0	9.0	100	59	
Vert.	202.909	QP	38.3	16.4	9.0	31.7	32.0	43.5	11.5	100	82	
Vert.	2390.000	PK	49.6	27.2	13.8	41.1	49.5	73.9	24.4	100	83	
Vert.	2400.000	PK	57.5	27.3	13.8	41.1	57.5	73.9	16.4	100	83	
Vert.	3203.982	PK	49.4	29.0	5.5	41.5	42.4	73.9	31.5	100	127	
Vert.	4007.000	PK	44.1	30.0	5.7	41.7	38.1	73.9	35.8	100	0	
Vert.	4090.400	PK	56.9	30.1	5.7	41.7	51.0	73.9	22.9	100	178	
Vert.	4804.000	PK	50.9	31.1	6.0	41.1	46.9	73.9	27.0	100	125	
Vert.	7206.000	PK	44.2	36.5	7.4	41.3	46.8	73.9	27.1	100	0	
Vert.	9608.000	PK	46.3	38.2	8.7	38.8	54.4	73.9	19.5	100	0	
Vert.	12010.000	PK	45.5	39.3	10.2	39.2	55.8	73.9	18.1	100	0	
Vert.	2390.000	AV	34.7	27.2	13.8	41.1	34.6	53.9	19.3	100	83	VBW:270Hz
Vert.	2400.000	AV	43.7	27.3	13.8	41.1	43.7	53.9	10.2	100	83	VBW:270Hz
Vert.	3203.982	AV	35.9	29.0	5.5	41.5	28.9	53.9	25.0	100	127	Not Detected(VBW:10Hz)
Vert.	4007.000	AV	34.9	30.0	5.7	41.7	28.9	53.9	25.0	100	0	Not Detected(VBW:10Hz)
Vert.	4090.400	AV	54.1	30.1	5.7	41.7	48.2	53.9	5.7	100	178	Not Detected(VBW:10Hz)
Vert.	4804.000	AV	42.2	31.1	6.0	41.1	38.2	53.9	15.7	100	125	VBW:270Hz
Vert.	7206.000	AV	35.8	36.5	7.4	41.3	38.4	53.9	15.5	100	0	VBW:270Hz
Vert.	9608.000	AV	35.6	38.2	8.7	38.8	43.7	53.9	10.2	100	0	VBW:270Hz
Vert.	12010.000	AV	35.2	39.3	10.2	39.2	45.5	53.9	8.4	100	0	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 & No.3 Semi Anechoic Chamber
 Date November 7, 2011 November 8, 2011
 Temperature / Humidity 22deg.C , 51%RH 23deg.C , 53%RH
 Engineer Takahiro Suzuki Takahiro Suzuki
 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.	75.334	QP	52.6	6.4	7.6	31.8	34.8	40.0	5.2	239	106	
Hori.	84.412	QP	48.6	7.2	7.7	31.8	31.7	40.0	8.3	196	116	
Hori.	153.778	QP	40.0	14.8	8.5	31.8	31.5	43.5	12.0	226	111	
Hori.	203.645	QP	41.1	16.4	9.0	31.7	34.8	43.5	8.7	161	18	
Hori.	212.680	QP	41.1	16.6	9.1	31.7	35.1	43.5	8.4	135	10	
Hori.	361.002	QP	47.2	15.4	7.2	31.8	38.0	46.0	8.0	100	114	
Hori.	3257.500	PK	50.5	29.0	5.4	41.6	43.3	73.9	30.6	100	59	
Hori.	4067.000	PK	44.6	30.1	5.7	41.7	38.7	73.9	35.2	100	0	
Hori.	4088.188	PK	55.2	30.1	5.7	41.7	49.3	73.9	24.6	100	104	
Hori.	4882.000	PK	51.8	31.2	6.0	40.9	48.1	73.9	25.8	100	152	
Hori.	7323.000	PK	46.5	36.8	7.4	41.4	49.3	73.9	24.6	100	0	
Hori.	9764.000	PK	45.1	38.5	8.7	38.8	53.5	73.9	20.4	100	133	
Hori.	12205.000	PK	44.7	39.3	10.3	39.2	55.1	73.9	18.8	100	351	
Hori.	3257.500	AV	44.3	29.0	5.4	41.6	37.1	53.9	16.8	100	59	Not Detected(VBW:10Hz)
Hori.	4067.000	AV	35.0	30.1	5.7	41.7	29.1	53.9	24.8	100	0	Not Detected(VBW:10Hz)
Hori.	4088.188	AV	51.5	30.1	5.7	41.7	45.6	53.9	8.3	100	104	Not Detected(VBW:10Hz)
Hori.	4882.000	AV	40.8	31.2	6.0	40.9	37.1	53.9	16.8	100	152	VBW:270Hz
Hori.	7323.000	AV	37.0	36.8	7.4	41.4	39.8	53.9	14.1	100	0	VBW:270Hz
Hori.	9764.000	AV	35.2	38.5	8.7	38.8	43.6	53.9	10.3	100	133	VBW:270Hz
Hori.	12205.000	AV	35.9	39.3	10.3	39.2	46.3	53.9	7.6	100	351	VBW:270Hz
Vert.	64.160	QP	51.9	7.3	7.5	31.8	34.9	40.0	5.1	100	353	
Vert.	77.006	QP	47.8	6.4	7.6	31.8	30.0	40.0	10.0	100	42	
Vert.	3257.590	PK	53.2	29.0	5.4	41.6	46.0	73.9	27.9	100	257	
Vert.	4067.000	PK	44.3	30.1	5.7	41.7	38.4	73.9	35.5	100	0	
Vert.	4088.188	PK	56.7	30.1	5.7	41.7	50.8	73.9	23.1	100	173	
Vert.	4882.000	PK	53.1	31.2	6.0	40.9	49.4	73.9	24.5	100	312	
Vert.	7323.000	PK	47.2	36.8	7.4	41.4	50.0	73.9	23.9	100	83	
Vert.	9764.000	PK	44.0	38.5	8.7	38.8	52.4	73.9	21.5	100	127	
Vert.	12205.000	PK	45.7	39.3	10.3	39.2	56.1	73.9	17.8	100	0	
Vert.	3257.590	AV	52.0	29.0	5.4	41.6	44.8	53.9	9.1	100	257	Not Detected(VBW:10Hz)
Vert.	4067.000	AV	34.8	30.1	5.7	41.7	28.9	53.9	25.0	100	0	Not Detected(VBW:10Hz)
Vert.	4088.188	AV	53.7	30.1	5.7	41.7	47.8	53.9	6.1	100	173	Not Detected(VBW:10Hz)
Vert.	4882.000	AV	43.1	31.2	6.0	40.9	39.4	53.9	14.5	100	312	VBW:270Hz
Vert.	7323.000	AV	36.3	36.8	7.4	41.4	39.1	53.9	14.8	100	83	VBW:270Hz
Vert.	9764.000	AV	35.1	38.5	8.7	38.8	43.5	53.9	10.4	100	127	VBW:270Hz
Vert.	12205.000	AV	35.5	39.3	10.3	39.2	45.9	53.9	8.0	100	0	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 & No.3 Semi Anechoic Chamber
 Date November 7, 2011 November 8, 2011
 Temperature / Humidity 22deg.C , 51%RH 23deg.C , 53%RH
 Engineer Takahiro Suzuki Takahiro Suzuki
 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.	73.739	QP	51.1	6.4	7.6	31.8	33.3	40.0	6.7	251	124	
Hori.	84.022	QP	49.7	7.1	7.7	31.8	32.7	40.0	7.3	227	110	
Hori.	153.761	QP	37.4	14.8	8.5	31.8	28.9	43.5	14.6	202	11	
Hori.	203.328	QP	40.7	16.4	9.0	31.7	34.4	43.5	9.1	200	27	
Hori.	211.223	QP	40.0	16.5	9.1	31.7	33.9	43.5	9.6	140	19	
Hori.	361.030	QP	48.2	15.4	7.2	31.8	39.0	46.0	7.0	100	106	
Hori.	2483.500	PK	49.1	27.5	13.7	41.1	49.2	73.9	24.7	100	139	
Hori.	2483.975	PK	48.1	27.5	13.7	41.1	48.2	73.9	25.7	100	0	
Hori.	3305.302	PK	52.0	29.1	5.4	41.6	44.9	73.9	29.0	100	164	
Hori.	4087.504	PK	55.1	30.1	5.7	41.7	49.2	73.9	24.7	100	185	
Hori.	4130.000	PK	44.4	30.1	5.8	41.7	38.6	73.9	35.3	100	0	
Hori.	4960.000	PK	47.5	31.4	5.8	40.8	44.1	73.9	29.8	100	65	
Hori.	7440.000	PK	47.4	37.0	7.3	41.5	50.2	73.9	23.7	100	83	
Hori.	9920.000	PK	45.1	38.8	8.8	38.8	53.9	73.9	20.0	100	21	
Hori.	12400.000	PK	46.3	39.4	10.3	39.2	56.8	73.9	17.1	100	238	
Hori.	2483.500	AV	34.9	27.5	13.7	41.1	35.0	53.9	18.9	100	139	VBW:270Hz
Hori.	2483.975	AV	34.3	27.5	13.7	41.1	34.4	53.9	19.5	100	0	Not Detected(VBW:10Hz)
Hori.	3305.302	AV	42.6	29.1	5.4	41.6	35.5	53.9	18.4	100	164	Not Detected(VBW:10Hz)
Hori.	4087.504	AV	51.2	30.1	5.7	41.7	45.3	53.9	8.6	100	185	Not Detected(VBW:10Hz)
Hori.	4130.000	AV	34.8	30.1	5.8	41.7	29.0	53.9	24.9	100	0	Not Detected(VBW:10Hz)
Hori.	4960.000	AV	39.3	31.4	6.0	40.8	35.9	53.9	18.0	100	65	VBW:270Hz
Hori.	7440.000	AV	36.8	37.0	7.3	41.5	39.6	53.9	14.3	100	83	VBW:270Hz
Hori.	9920.000	AV	33.9	38.8	8.8	38.8	42.7	53.9	11.2	100	21	VBW:270Hz
Hori.	12400.000	AV	35.3	39.4	10.3	39.2	45.8	53.9	8.1	100	238	VBW:270Hz
Vert.	64.059	QP	48.9	7.3	7.5	31.8	31.9	40.0	8.1	100	12	
Vert.	2483.500	PK	49.1	27.5	13.7	41.1	49.2	73.9	24.7	100	33	
Vert.	2483.975	PK	49.3	27.5	13.7	41.1	49.4	73.9	24.5	100	152	
Vert.	3305.370	PK	51.7	29.1	5.4	41.6	44.6	73.9	29.3	100	210	
Vert.	4087.504	PK	57.0	30.1	5.7	41.7	51.1	73.9	22.8	100	182	
Vert.	4130.000	PK	44.1	30.1	5.8	41.7	38.3	73.9	35.6	100	0	
Vert.	4960.000	PK	49.3	31.4	6.0	40.8	45.9	73.9	28.0	100	43	
Vert.	7440.000	PK	47.5	37.0	7.3	41.5	50.3	73.9	23.6	100	108	
Vert.	9920.000	PK	45.5	38.8	8.8	38.8	54.3	73.9	19.6	100	321	
Vert.	12400.000	PK	46.4	39.4	10.3	39.2	56.9	73.9	17.0	100	98	
Vert.	2483.500	AV	35.2	27.5	13.7	41.1	35.3	53.9	18.6	100	33	VBW:270Hz
Vert.	2483.975	AV	34.8	27.5	13.7	41.1	34.9	53.9	19.0	100	152	Not Detected(VBW:10Hz)
Vert.	3305.370	AV	43.3	29.1	5.4	41.6	36.2	53.9	17.7	100	210	Not Detected(VBW:10Hz)
Vert.	4087.504	AV	54.1	30.1	5.7	41.7	48.2	53.9	5.7	100	182	Not Detected(VBW:10Hz)
Vert.	4130.000	AV	34.7	30.1	5.8	41.7	28.9	53.9	25.0	100	0	Not Detected(VBW:10Hz)
Vert.	4960.000	AV	38.9	31.4	6.0	40.8	35.5	53.9	18.4	100	43	VBW:270Hz
Vert.	7440.000	AV	37.1	37.0	7.3	41.5	39.9	53.9	14.0	100	108	VBW:270Hz
Vert.	9920.000	AV	34.8	38.8	8.8	38.8	43.6	53.9	10.3	100	321	VBW:270Hz
Vert.	12400.000	AV	35.2	39.4	10.3	39.2	45.7	53.9	8.2	100	98	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 & No.3 Semi Anechoic Chamber
 Date November 7, 2011 November 8, 2011
 Temperature / Humidity 22deg.C , 51%RH 23deg.C , 53%RH
 Engineer Takahiro Suzuki Takahiro Suzuki
 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.	73.696	QP	51.5	6.4	7.6	31.8	33.7	40.0	6.3	257	124	
Hori.	84.236	QP	49.0	7.2	7.7	31.8	32.1	40.0	7.9	240	105	
Hori.	202.580	QP	41.5	16.4	9.0	31.7	35.2	43.5	8.3	160	14	
Hori.	213.061	QP	40.3	16.6	9.1	31.7	34.3	43.5	9.2	134	3	
Hori.	348.748	QP	47.9	15.1	7.2	31.8	38.4	46.0	7.6	100	111	
Hori.	2390.000	PK	48.6	27.2	13.8	41.1	48.5	73.9	25.4	100	126	
Hori.	3203.200	PK	47.6	29.0	5.5	41.5	40.6	73.9	33.3	100	112	
Hori.	4007.000	PK	44.3	30.0	5.7	41.7	38.3	73.9	35.6	100	0	
Hori.	4090.400	PK	55.3	30.1	5.7	41.7	49.4	73.9	24.5	100	100	
Hori.	4804.000	PK	57.0	31.1	6.0	41.1	53.0	73.9	20.9	100	121	
Hori.	7206.000	PK	46.0	36.5	7.4	41.3	48.6	73.9	25.3	100	0	
Hori.	9608.000	PK	45.3	38.2	8.7	38.8	53.4	73.9	20.5	100	0	
Hori.	12010.000	PK	45.2	39.3	10.2	39.2	55.5	73.9	18.4	100	0	
Hori.	2390.000	AV	35.5	27.2	13.8	41.1	35.4	53.9	18.5	100	126	VBW:270Hz
Hori.	3203.200	AV	36.6	29.0	5.5	41.5	29.6	53.9	24.3	100	112	Not Detected(VBW:10Hz)
Hori.	4007.000	AV	34.5	30.0	5.7	41.7	28.5	53.9	25.4	100	0	Not Detected(VBW:10Hz)
Hori.	4090.400	AV	49.3	30.1	5.7	41.7	43.4	53.9	10.5	100	100	Not Detected(VBW:10Hz)
Hori.	4804.000	AV	48.3	31.1	6.0	41.1	44.3	53.9	9.6	100	121	VBW:270Hz
Hori.	7206.000	AV	36.6	36.5	7.4	41.3	39.2	53.9	14.7	100	0	VBW:270Hz
Hori.	9608.000	AV	34.6	38.2	8.7	38.8	42.7	53.9	11.2	100	0	VBW:270Hz
Hori.	12010.000	AV	36.0	39.3	10.2	39.2	46.3	53.9	7.6	100	0	VBW:270Hz
Vert.	64.056	QP	48.7	7.3	7.5	31.8	31.7	40.0	8.3	100	12	
Vert.	167.987	QP	46.1	15.3	8.7	31.8	38.3	43.5	5.2	100	118	
Vert.	2390.000	PK	48.1	27.2	13.8	41.1	48.0	73.9	25.9	100	236	
Vert.	3203.200	PK	49.2	29.0	5.5	41.5	42.2	73.9	31.7	100	122	
Vert.	4007.000	PK	44.2	30.0	5.7	41.7	38.2	73.9	35.7	100	0	
Vert.	4090.400	PK	55.6	30.1	5.7	41.7	49.7	73.9	24.2	100	170	
Vert.	4804.000	PK	55.9	31.1	6.0	41.1	51.9	73.9	22.0	100	127	
Vert.	7206.000	PK	44.0	36.5	7.4	41.3	46.6	73.9	27.3	100	0	
Vert.	9608.000	PK	46.5	38.2	8.7	38.8	54.6	73.9	19.3	100	0	
Vert.	12010.000	PK	45.2	39.3	10.2	39.2	55.5	73.9	18.4	100	0	
Vert.	2390.000	AV	34.7	27.2	13.8	41.1	34.6	53.9	19.3	100	236	VBW:270Hz
Vert.	3203.200	AV	35.8	29.0	5.5	41.5	28.8	53.9	25.1	100	122	Not Detected(VBW:10Hz)
Vert.	4007.000	AV	34.6	30.0	5.7	41.7	28.6	53.9	25.3	100	0	Not Detected(VBW:10Hz)
Vert.	4090.400	AV	53.7	30.1	5.7	41.7	47.8	53.9	6.1	100	170	Not Detected(VBW:10Hz)
Vert.	4804.000	AV	45.6	31.1	6.0	41.1	41.6	53.9	12.3	100	127	VBW:270Hz
Vert.	7206.000	AV	35.3	36.5	7.4	41.3	37.9	53.9	16.0	100	0	VBW:270Hz
Vert.	9608.000	AV	35.4	38.2	8.7	38.8	43.5	53.9	10.4	100	0	VBW:270Hz
Vert.	12010.000	AV	35.3	39.3	10.2	39.2	45.6	53.9	8.3	100	0	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	96.6	27.3	13.8	41.1	96.6	-	-	Carrier
Hori.	2400.000	PK	47.8	27.3	13.8	41.1	47.8	76.6	28.8	
Vert.	2402.000	PK	92.1	27.3	13.8	41.1	92.1	-	-	Carrier
Vert.	2400.000	PK	44.3	27.3	13.8	41.1	44.3	72.1	27.8	

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

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 & No.3 Semi Anechoic Chamber
 Date November 7, 2011 November 8, 2011
 Temperature / Humidity 22deg.C , 51%RH 23deg.C , 53%RH
 Engineer Takahiro Suzuki Takahiro Suzuki
 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.	74.284	QP	51.9	6.4	7.6	31.8	34.1	40.0	5.9	272	129	
Hori.	84.555	QP	48.7	7.2	7.7	31.8	31.8	40.0	8.2	235	100	
Hori.	152.807	QP	42.4	14.7	8.5	31.8	33.8	43.5	9.7	203	9	
Hori.	202.999	QP	41.7	16.4	9.0	31.7	35.4	43.5	8.1	158	2	
Hori.	213.136	QP	40.6	16.6	9.1	31.7	34.6	43.5	8.9	128	3	
Hori.	358.910	QP	48.4	15.4	7.2	31.8	39.2	46.0	6.8	100	321	
Hori.	3257.500	PK	53.3	29.0	5.4	41.6	46.1	73.9	27.8	100	255	
Hori.	4067.000	PK	44.8	30.1	5.7	41.7	38.9	73.9	35.0	100	0	
Hori.	4088.188	PK	56.5	30.1	5.7	41.7	50.6	73.9	23.3	100	168	
Hori.	4882.000	PK	52.8	31.2	6.0	40.9	49.1	73.9	24.8	100	310	
Hori.	7323.000	PK	47.5	36.8	7.4	41.4	50.3	73.9	23.6	100	78	
Hori.	9764.000	PK	43.8	38.5	8.7	38.8	52.2	73.9	21.7	100	109	
Hori.	12205.000	PK	45.5	39.3	10.3	39.2	55.9	73.9	18.0	100	12	
Hori.	3257.500	AV	51.7	29.0	5.4	41.6	44.5	53.9	9.4	100	255	Not Detected(VBW:10Hz)
Hori.	4067.000	AV	34.6	30.1	5.7	41.7	28.7	53.9	25.2	100	0	Not Detected(VBW:10Hz)
Hori.	4088.188	AV	53.4	30.1	5.7	41.7	47.5	53.9	6.4	100	168	Not Detected(VBW:10Hz)
Hori.	4882.000	AV	43.3	31.2	6.0	40.9	39.6	53.9	14.3	100	310	VBW:270Hz
Hori.	7323.000	AV	36.1	36.8	7.4	41.4	38.9	53.9	15.0	100	78	VBW:270Hz
Hori.	9764.000	AV	35.0	38.5	8.7	38.8	43.4	53.9	10.5	100	109	VBW:270Hz
Hori.	12205.000	AV	35.3	39.3	10.3	39.2	45.7	53.9	8.2	100	12	VBW:270Hz
Vert.	64.119	QP	49.0	7.3	7.5	31.8	32.0	40.0	8.0	100	46	
Vert.	74.243	QP	46.3	6.4	7.6	31.8	28.5	40.0	11.5	100	17	
Vert.	3257.500	PK	50.2	29.0	5.4	41.6	43.0	73.9	30.9	100	63	
Vert.	4067.000	PK	44.5	30.1	5.7	41.7	38.6	73.9	35.3	100	0	
Vert.	4088.188	PK	55.0	30.1	5.7	41.7	49.1	73.9	24.8	100	98	
Vert.	4882.000	PK	53.8	31.2	6.0	40.9	50.1	73.9	23.8	100	58	
Vert.	7323.000	PK	46.7	36.8	7.4	41.4	49.5	73.9	24.4	100	236	
Vert.	9764.000	PK	44.8	38.5	8.7	38.8	53.2	73.9	20.7	100	112	
Vert.	12205.000	PK	44.3	39.3	10.3	39.2	54.7	73.9	19.2	100	122	
Vert.	3257.500	AV	44.1	29.0	5.4	41.6	36.9	53.9	17.0	100	63	Not Detected(VBW:10Hz)
Vert.	4067.000	AV	34.5	30.1	5.7	41.7	28.6	53.9	25.3	100	0	Not Detected(VBW:10Hz)
Vert.	4088.188	AV	51.1	30.1	5.7	41.7	45.2	53.9	8.7	100	98	Not Detected(VBW:10Hz)
Vert.	4882.000	AV	40.3	31.2	6.0	40.9	36.6	53.9	17.3	100	58	VBW:270Hz
Vert.	7323.000	AV	37.4	36.8	7.4	41.4	40.2	53.9	13.7	100	236	VBW:270Hz
Vert.	9764.000	AV	34.9	38.5	8.7	38.8	43.3	53.9	10.6	100	112	VBW:270Hz
Vert.	12205.000	AV	35.6	39.3	10.3	39.2	46.0	53.9	7.9	100	122	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 & No.3 Semi Anechoic Chamber
 Date November 7, 2011 November 8, 2011
 Temperature / Humidity 22deg.C , 51%RH 23deg.C , 53%RH
 Engineer Takahiro Suzuki Takahiro Suzuki
 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.	72.640	QP	51.5	6.4	7.6	31.8	33.7	40.0	6.3	247	115	
Hori.	84.300	QP	48.5	7.2	7.7	31.8	31.6	40.0	8.4	248	117	
Hori.	152.512	QP	42.2	14.7	8.5	31.8	33.6	43.5	9.9	200	11	
Hori.	203.002	QP	41.4	16.4	9.0	31.7	35.1	43.5	8.4	163	6	
Hori.	212.906	QP	40.9	16.6	9.1	31.7	34.9	43.5	8.6	132	353	
Hori.	241.689	QP	42.1	17.1	9.4	31.7	36.9	46.0	9.1	153	162	
Hori.	349.915	QP	48.9	15.2	7.2	31.8	39.5	46.0	6.5	100	287	
Hori.	2483.500	PK	49.4	27.5	13.7	41.1	49.5	73.9	24.4	100	138	
Hori.	2483.950	PK	49.2	27.5	13.7	41.1	49.3	73.9	24.6	100	138	
Hori.	3305.320	PK	52.9	29.1	5.4	41.6	45.8	73.9	28.1	100	151	
Hori.	4087.500	PK	55.3	30.1	5.7	41.7	49.4	73.9	24.5	100	180	
Hori.	4133.000	PK	44.6	30.1	5.8	41.7	38.8	73.9	35.1	100	0	
Hori.	4960.000	PK	48.0	31.4	6.0	40.8	44.6	73.9	29.3	100	52	
Hori.	7440.000	PK	47.6	37.0	7.3	41.5	50.4	73.9	23.5	100	81	
Hori.	9920.000	PK	45.0	38.8	8.8	38.8	53.8	73.9	20.1	100	34	
Hori.	12400.000	PK	46.6	39.4	10.3	39.2	57.1	73.9	16.8	100	221	
Hori.	2483.500	AV	35.8	27.5	13.7	41.1	35.9	53.9	18.0	100	138	
Hori.	2483.950	AV	35.4	27.5	13.7	41.1	35.5	53.9	18.4	100	138	Not Detected(VBW:10Hz)
Hori.	3305.320	AV	43.2	29.1	5.4	41.6	36.1	53.9	17.8	100	151	Not Detected(VBW:10Hz)
Hori.	4087.500	AV	51.5	30.1	5.7	41.7	45.6	53.9	8.3	100	180	Not Detected(VBW:10Hz)
Hori.	4133.000	AV	34.6	30.1	5.8	41.7	28.8	53.9	25.1	100	0	Not Detected(VBW:10Hz)
Hori.	4960.000	AV	39.7	31.4	6.0	40.8	36.3	53.9	17.6	100	52	VBW:270Hz
Hori.	7440.000	AV	37.0	37.0	7.3	41.5	39.8	53.9	14.1	100	81	VBW:270Hz
Hori.	9920.000	AV	34.3	38.8	8.8	38.8	43.1	53.9	10.8	100	34	VBW:270Hz
Hori.	12400.000	AV	35.7	39.4	10.3	39.2	46.2	53.9	7.7	100	221	VBW:270Hz
Vert.	63.922	QP	49.3	7.4	7.5	31.8	32.4	40.0	7.6	100	54	
Vert.	167.982	QP	45.6	15.3	8.7	31.8	37.8	43.5	5.7	100	129	
Vert.	2483.500	PK	50.0	27.5	13.7	41.1	50.1	73.9	23.8	100	34	
Vert.	2483.950	PK	49.8	27.5	13.7	41.1	49.9	73.9	24.0	100	34	
Vert.	3305.320	PK	52.1	29.1	5.4	41.6	45.0	73.9	28.9	100	159	
Vert.	4087.500	PK	57.2	30.1	5.7	41.7	51.3	73.9	22.6	100	176	
Vert.	4133.000	PK	44.5	30.1	5.8	41.7	38.7	73.9	35.2	100	0	
Vert.	4960.000	PK	49.0	31.4	6.0	40.8	45.6	73.9	28.3	100	41	
Vert.	7440.000	PK	47.2	37.0	7.3	41.5	50.0	73.9	23.9	100	99	
Vert.	9920.000	PK	45.1	38.8	8.8	38.8	53.9	73.9	20.0	100	309	
Vert.	12400.000	PK	46.1	39.4	10.3	39.2	56.6	73.9	17.3	100	88	
Vert.	2483.500	AV	35.4	27.5	13.7	41.1	35.5	53.9	18.4	100	34	
Vert.	2483.950	AV	35.0	27.5	13.7	41.1	35.1	53.9	18.8	100	34	Not Detected(VBW:10Hz)
Vert.	3305.320	AV	42.9	29.1	5.4	41.6	35.8	53.9	18.1	100	159	Not Detected(VBW:10Hz)
Vert.	4087.500	AV	54.4	30.1	5.7	41.7	48.5	53.9	5.4	100	176	Not Detected(VBW:10Hz)
Vert.	4133.000	AV	34.7	30.1	5.8	41.7	28.9	53.9	25.0	100	0	Not Detected(VBW:10Hz)
Vert.	4960.000	AV	39.1	31.4	6.0	40.8	35.7	53.9	18.2	100	41	VBW:270Hz
Vert.	7440.000	AV	36.8	37.0	7.3	41.5	39.6	53.9	14.3	100	99	VBW:270Hz
Vert.	9920.000	AV	34.5	38.8	8.8	38.8	43.3	53.9	10.6	100	309	VBW:270Hz
Vert.	12400.000	AV	35.0	39.4	10.3	39.2	45.5	53.9	8.4	100	88	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

*The 10th harmonic was not seen so the result was its base noise level.

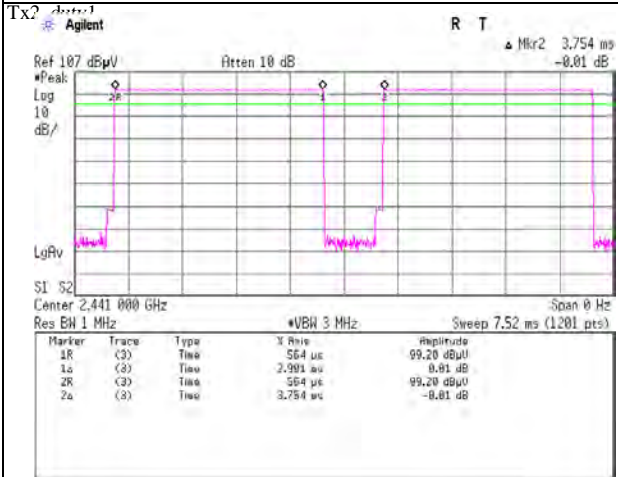
Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

VBW (Average) Calculation chart

Tx, Bluetooth, BDR, PRBS9

VBW (Average) Calculation

**VBW: $1/x = 266.38\text{Hz} < 270\text{Hz}$
 $x: (\text{Tx on} + \text{Tx off}) = 3.754\text{ms}$**



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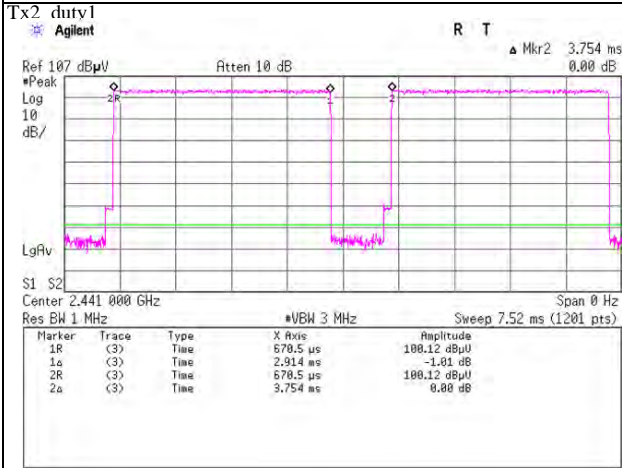
Facsimile : +81 463 50 6401

VBW (Average) Calculation chart

Tx, Bluetooth, EDR, PRBS9

VBW (Average) Calculation

**VBW: $1/x = 266.38\text{Hz} < 270\text{Hz}$
 $x: (\text{Tx on} + \text{Tx off}) = 3.754\text{ms}$**



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

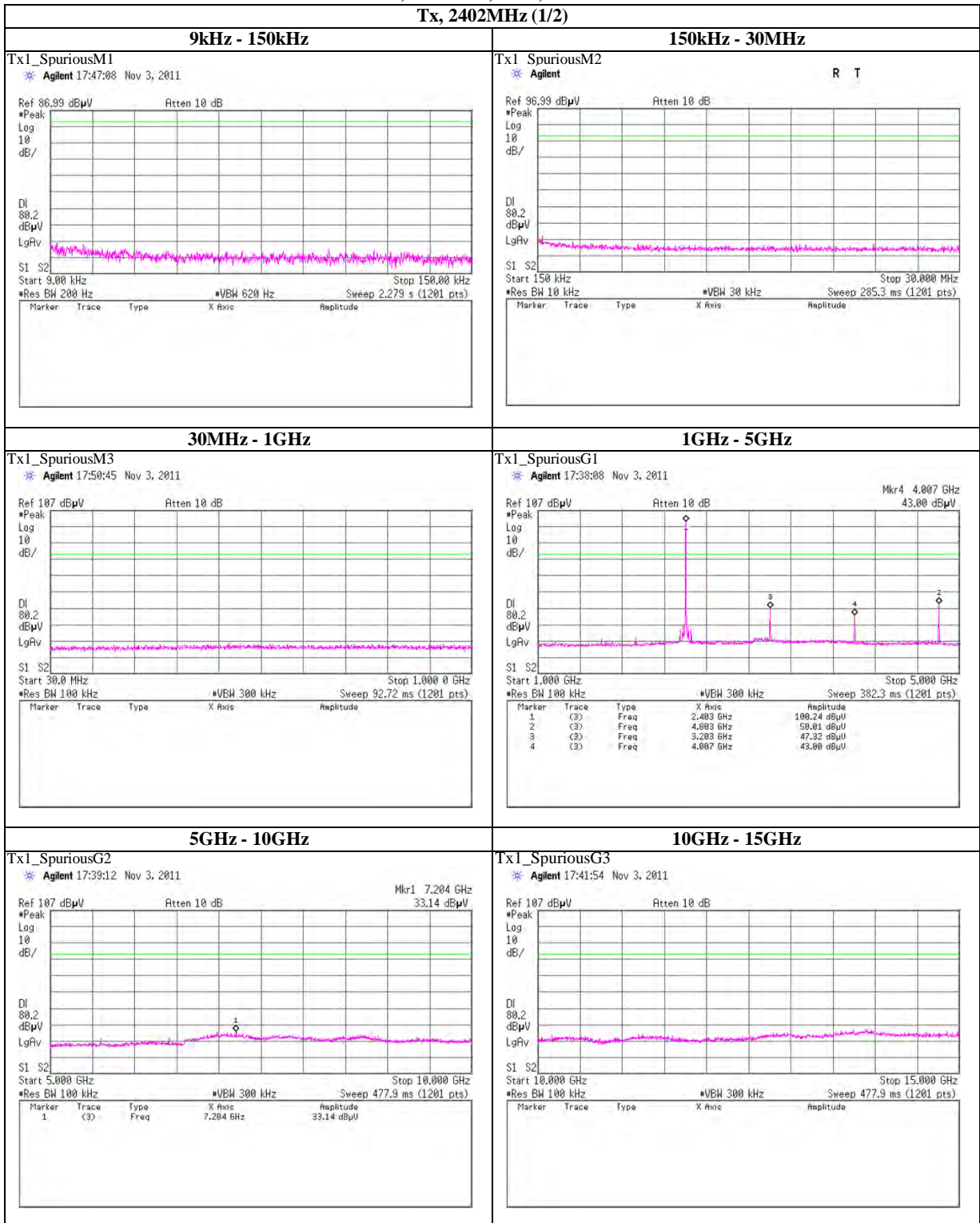
Telephone : +81 463 50 6400

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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (1/2)



UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (2/2)

15GHz - 20GHz	20GHz - 25GHz																				
<p>Tx1_SpuriousG4 Agilent 17:43:32 Nov 3, 2011</p>  <p>Ref 107 dBμV Atten 10 dB #Peak Log 10 dB/ DI 80.2 dBμV LgRv S1 S2 Start 15.000 GHz Stop 20.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (1201 pts)</p> <table border="1"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Marker	Trace	Type	X Axis	Amplitude						<p>Tx1_SpuriousG5 Agilent 17:44:14 Nov 3, 2011</p>  <p>Ref 107 dBμV Atten 10 dB #Peak Log 10 dB/ DI 80.2 dBμV LgRv S1 S2 Start 20.000 GHz Stop 25.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 477.9 ms (1201 pts)</p> <table border="1"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Marker	Trace	Type	X Axis	Amplitude					
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<p>Tx1_SpuriousG8</p>																					

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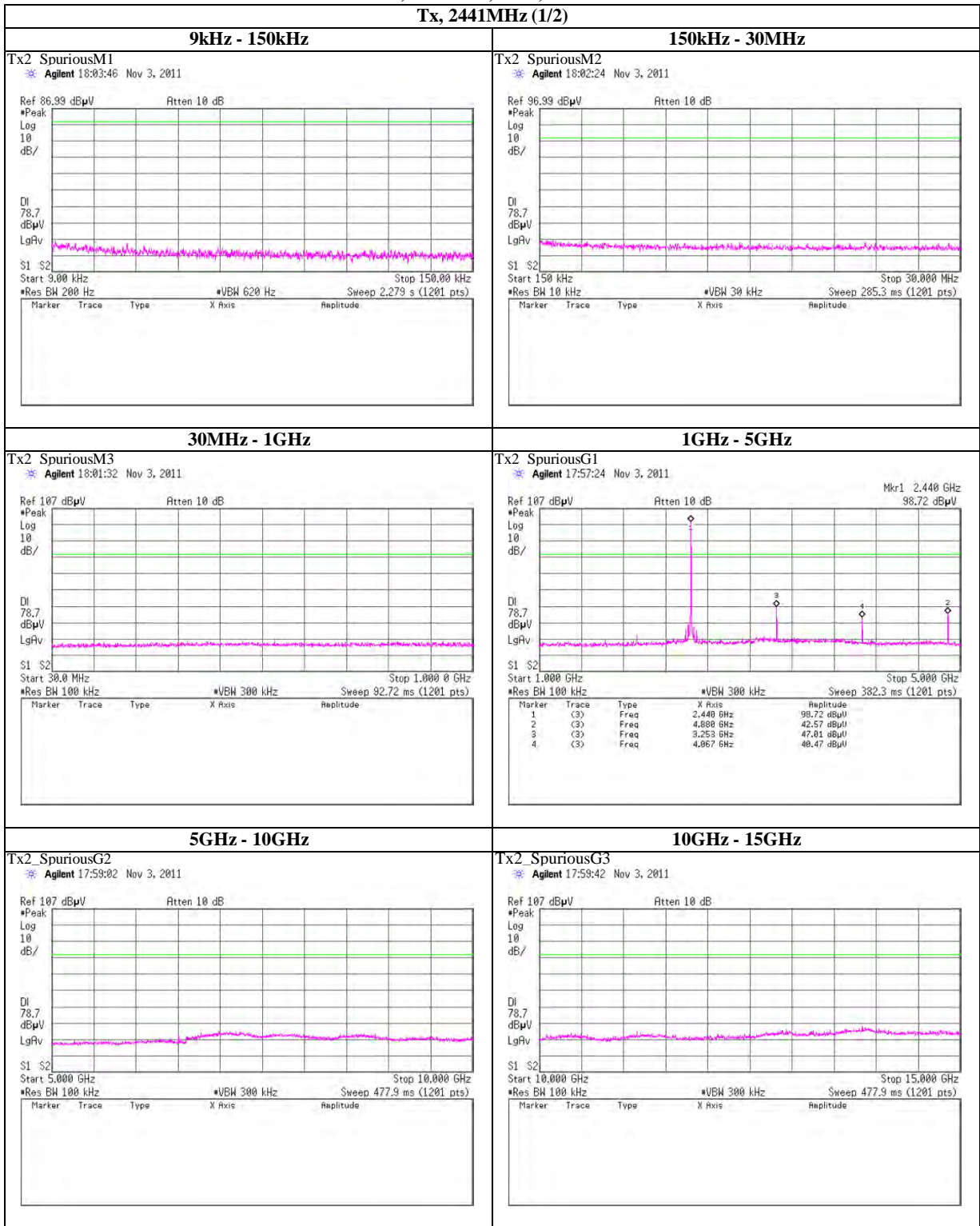
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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)

15GHz - 20GHz	20GHz - 25GHz																				
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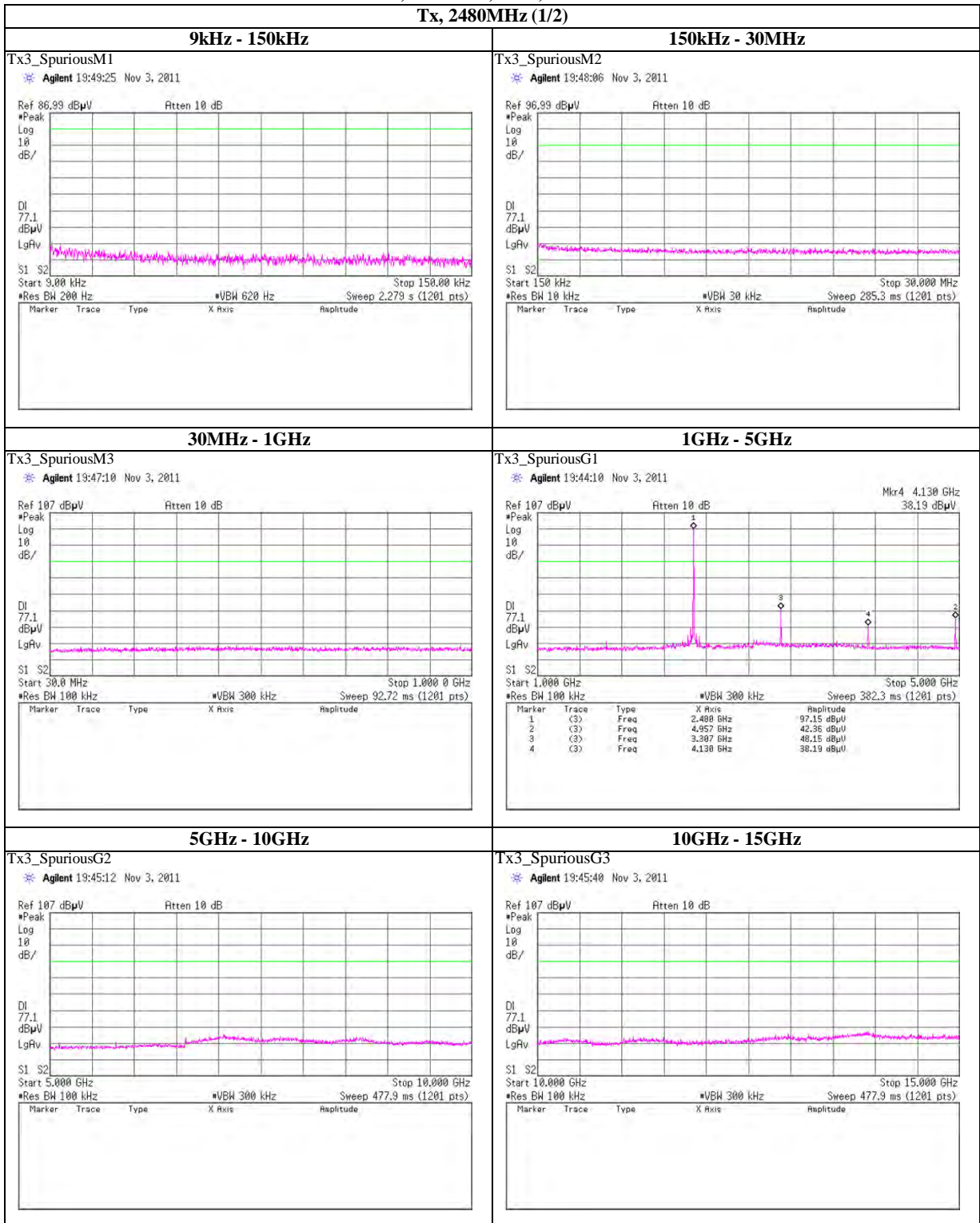
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (1/2)



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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (2/2)

15GHz - 20GHz	20GHz - 25GHz																				
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<p>Tx3_SpuriousG8</p>																					

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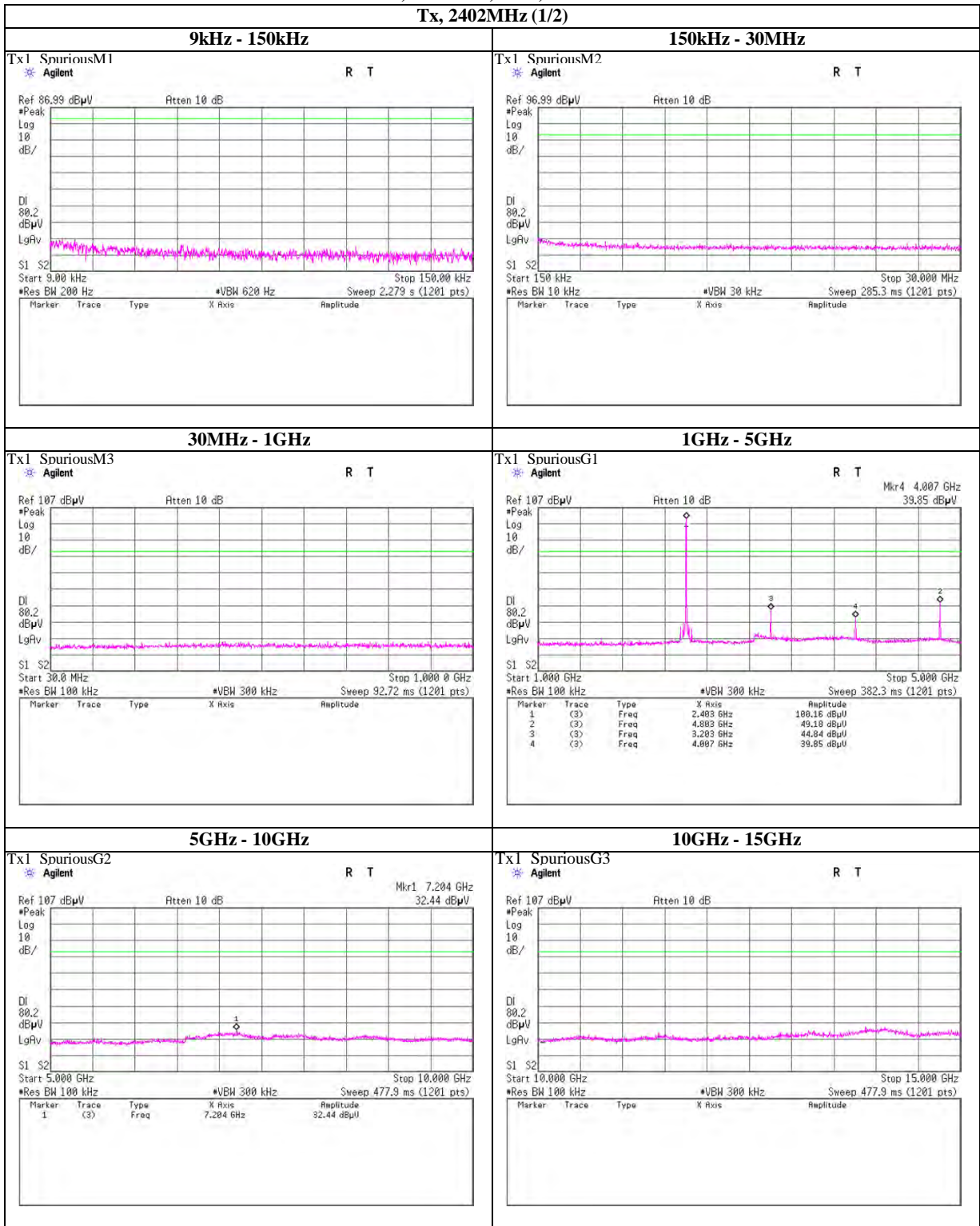
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (1/2)



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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (2/2)

15GHz - 20GHz		20GHz - 25GHz	
<p>Tx1_SpuriousG4 Agilent</p> <p>Ref 107 dBµV Atten 10 dB</p> <p>Start 15.000 GHz Stop 20.000 GHz Res BW 100 kHz VBW 300 kHz Sweep 477.9 ms (1201 pts)</p>	<p>Tx1_SpuriousG5 Agilent</p> <p>Ref 107 dBµV Atten 10 dB</p> <p>Start 20.000 GHz Stop 25.000 GHz Res BW 100 kHz VBW 300 kHz Sweep 477.9 ms (1201 pts)</p>		
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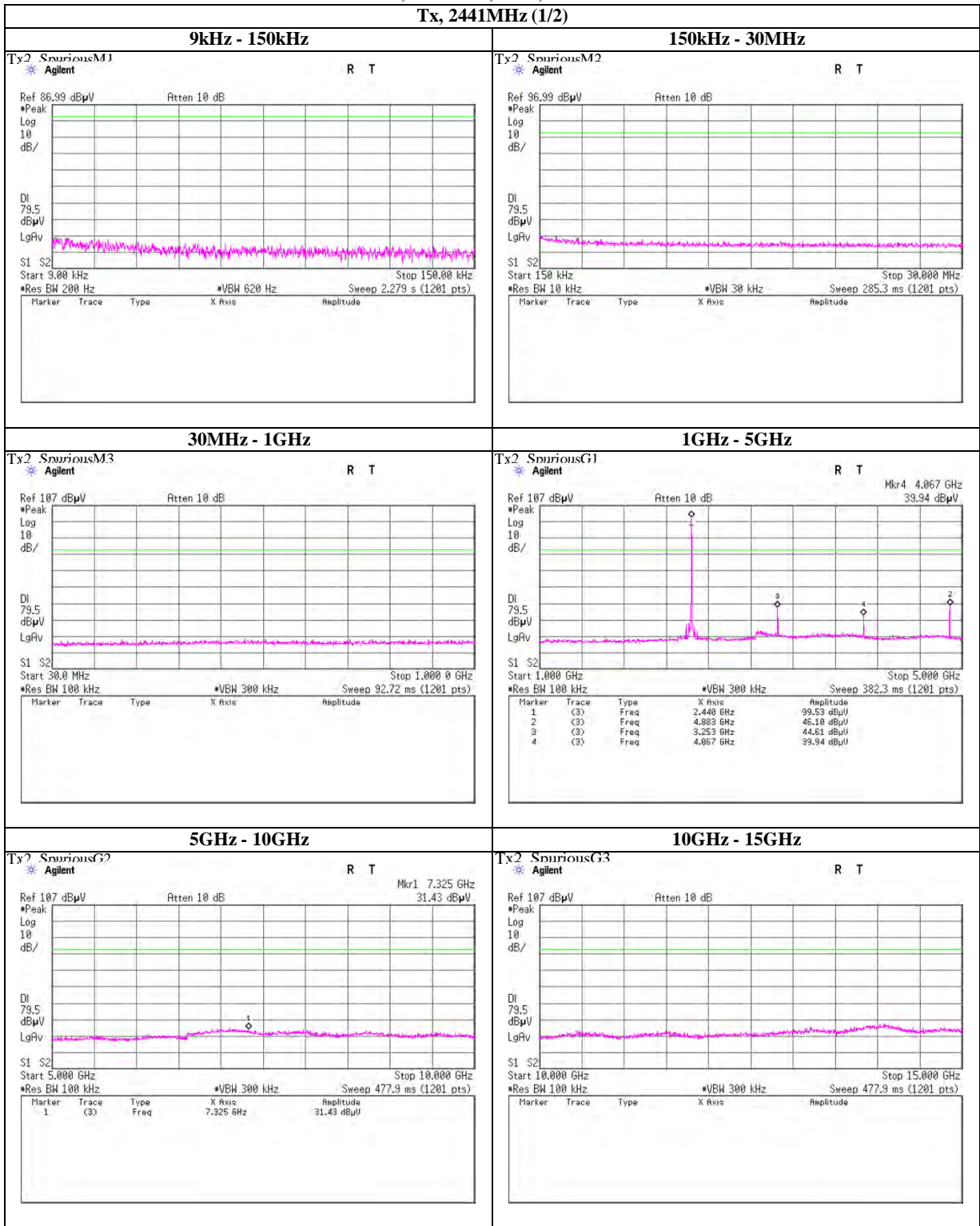
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (1/2)



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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (2/2)



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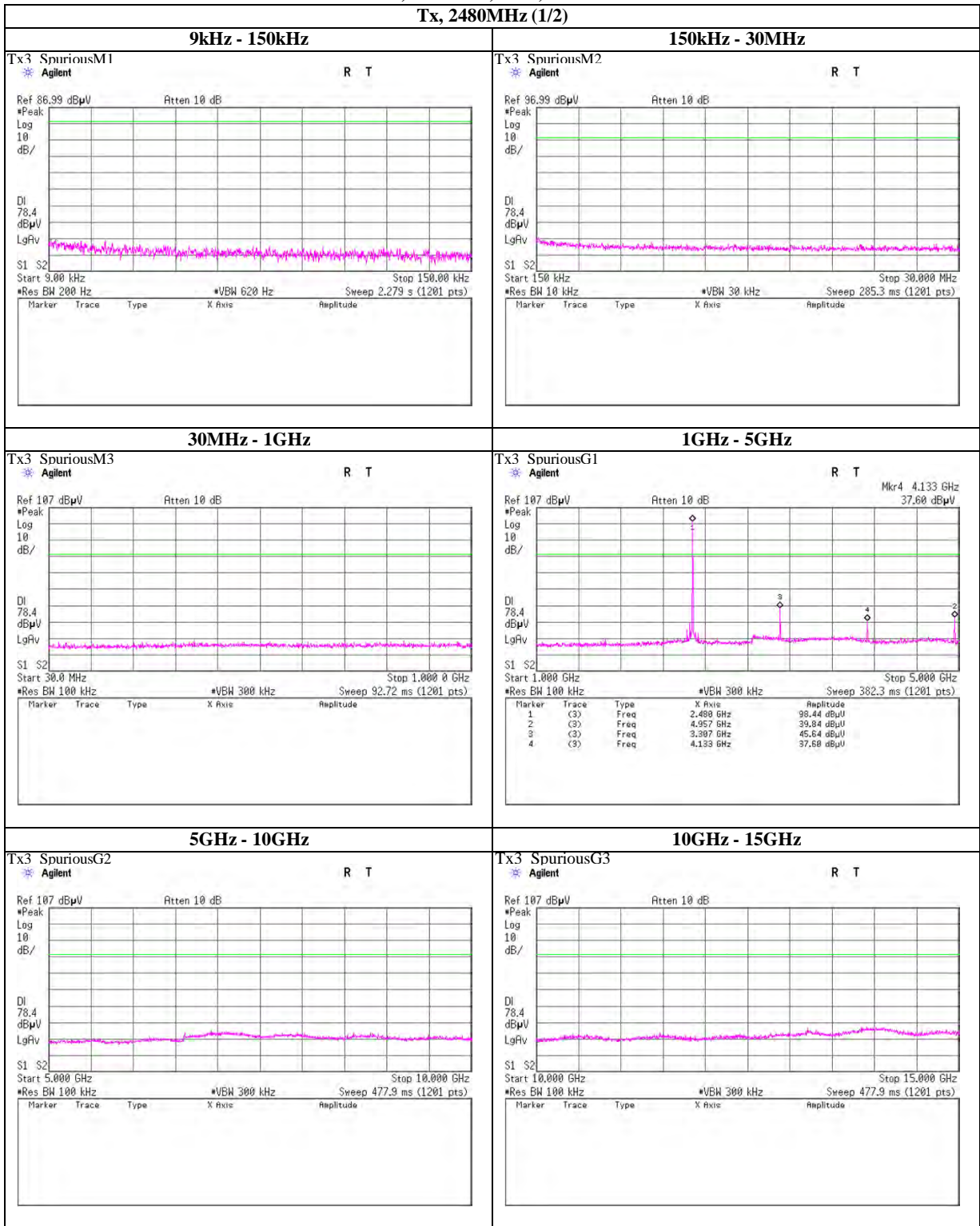
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Spurious emission (Conducted)

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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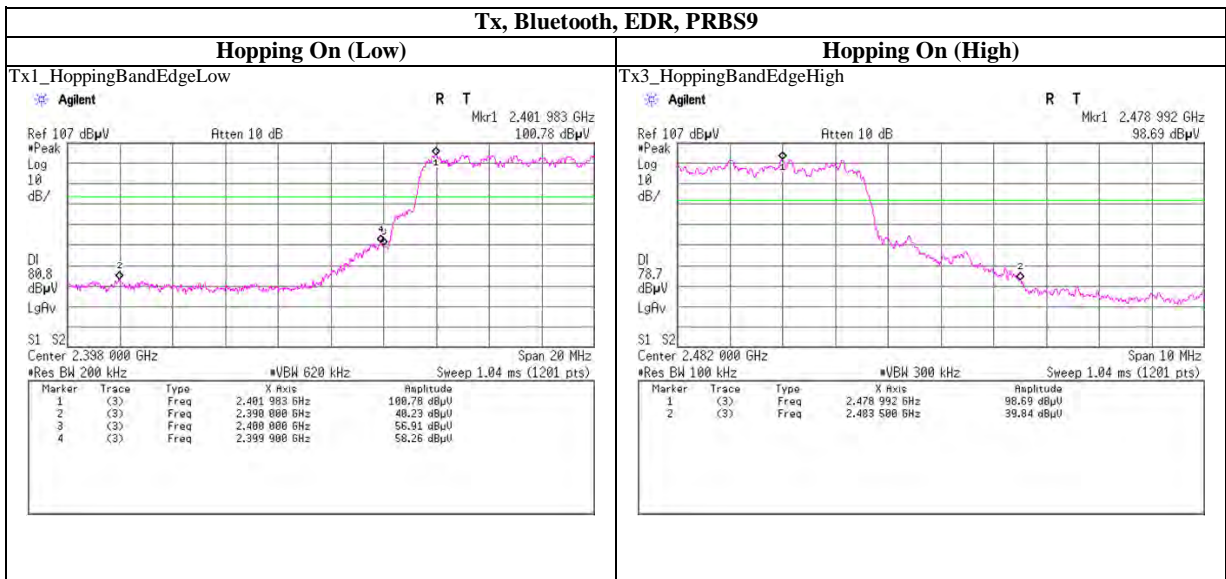
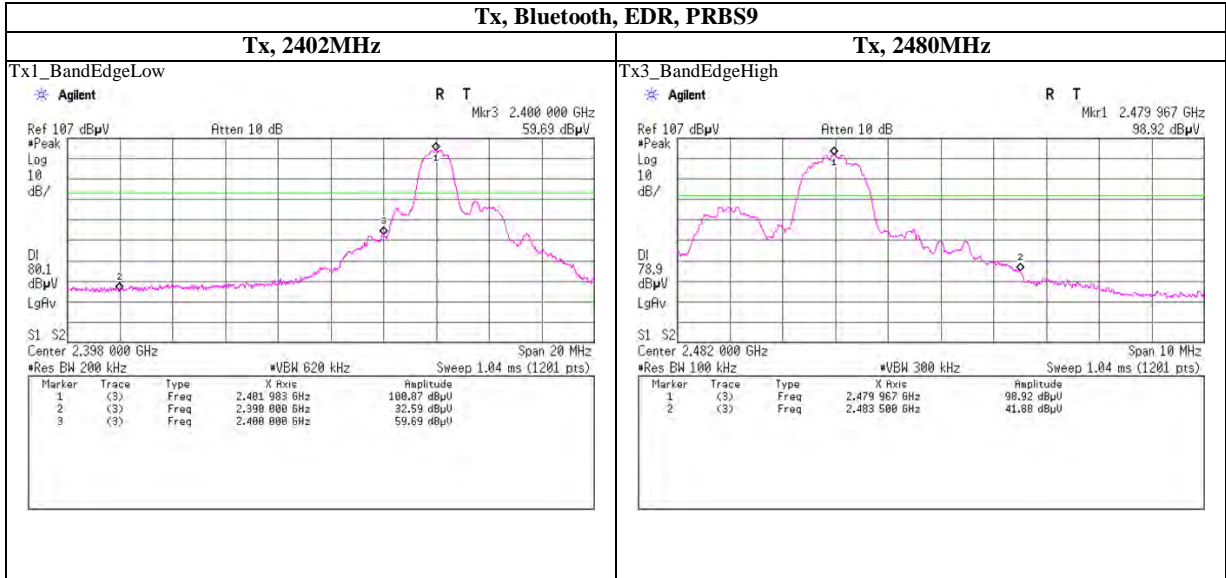
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Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Band Edge compliance



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Shonan EMC Lab.

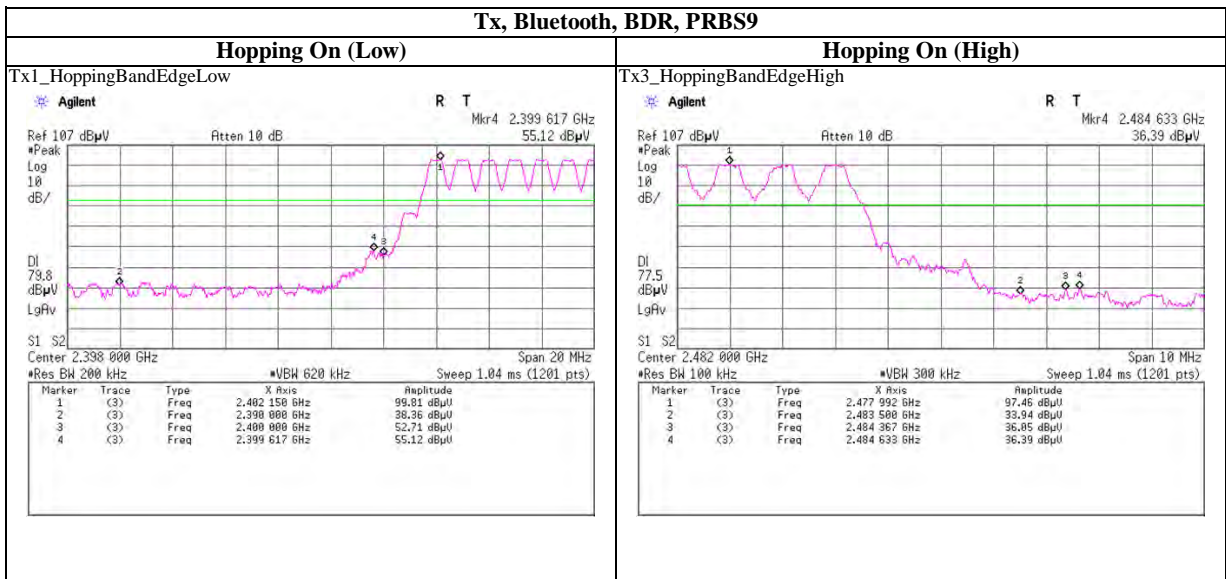
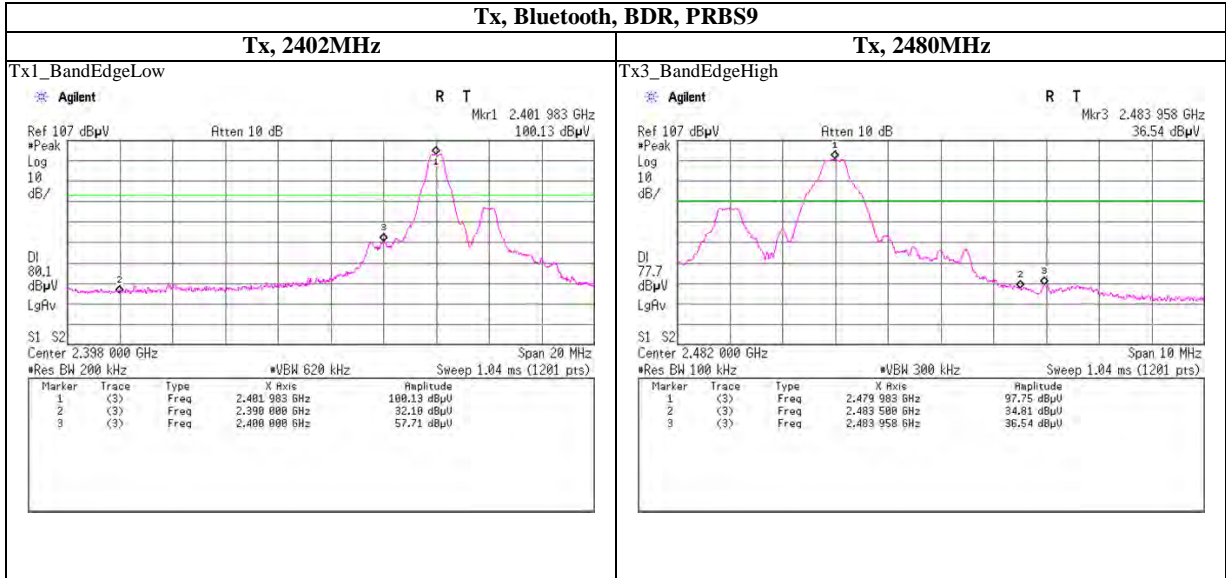
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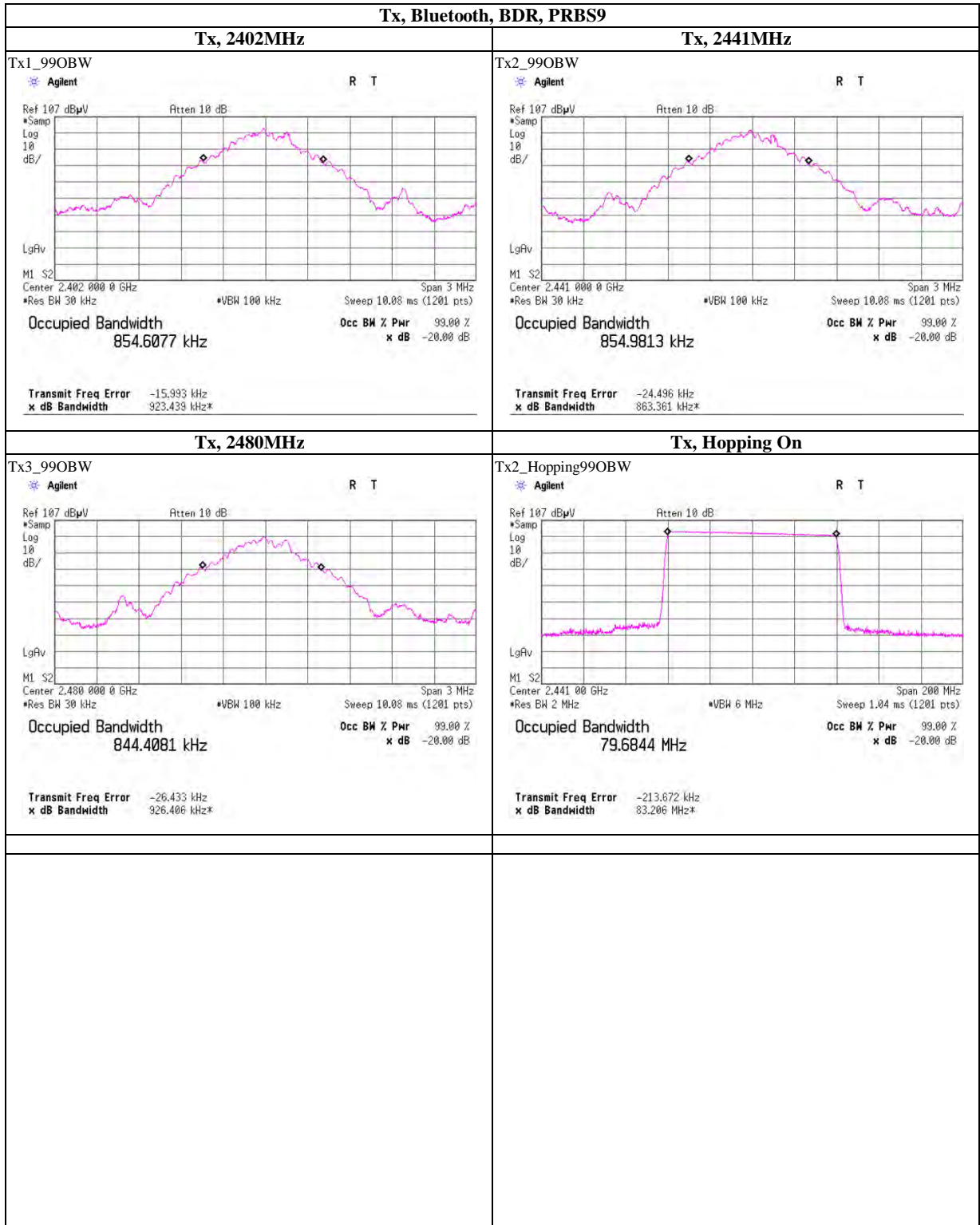
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99% Occupied Bandwidth



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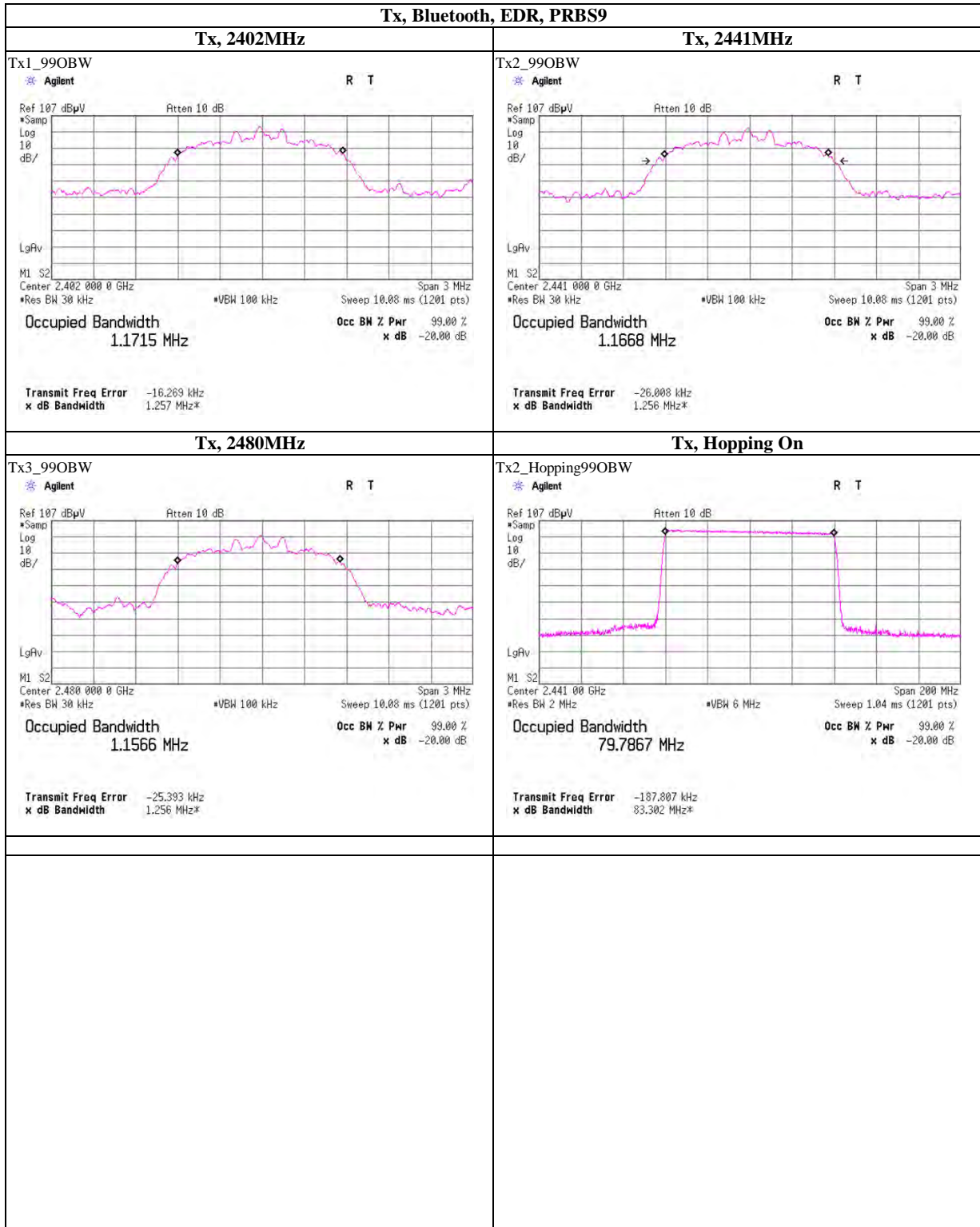
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APPENDIX 2
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2011/07/19 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2011/04/28 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2011/05/27 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2011/08/28 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2011/02/23 * 12
STR-03	Test Receiver	Rohde & Schwarz	ESI40	100054/040	RE	2011/07/28 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE	-
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2011/03/15 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2011/03/16 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2011/03/16 * 12
SAT10-04	Attenuator(above1GHz)	Agilent	8493C-010	74863	RE	2010/12/15 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2010/12/15 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2011/02/17 * 12
SAT6-01	Attenuator	JFW	50HF-006N	-	RE	2011/02/17 * 12
SAT3-04	Attenuator	JFW	50HF-003N	-	RE	2011/02/17 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2011/10/15 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2011/04/28 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2011/04/28 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A0888	RE	2011/08/17 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2011/02/23 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2011/10/22 * 12
SJM-12	Measure	PROMART	SEN1935	-	RE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2011/09/01 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2010/11/16 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	AT	2011/03/23 * 12
SCC-G11	Coaxial Cable	Suhner	SUCOFLEX 102	31595/2	AT	2011/03/23 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2011/03/02 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2011/04/12 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2011/04/12 * 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