RADIO TEST REPORT

Test Report No.: 32KE0201-SH-01-A

Applicant	**:**	**Sony Corporation**
Type of Equipment	**:**	**Bluetooth Audio System**
Model No.	**:**	**MEX-GS600BT**
FCC ID	**:**	**AK8MEXGS600BT**
Test regulation	**:**	**FCC Part15 Subpart C: 2012**
Test result	**:**	**Complied**

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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: June 26 to July 3, 2012

Tested by: M. Hosaka

Makoto Hosaka
Engineer of WiSE Japan,
UL Verification Service

Approved by : T. Imamura

Toyokazu Imamura
Leader of WiSE Japan,
UL Verification Service

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

JAB Testing RTL02610

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REVISION HISTORY

Original Test Report No.: 32KE0201-SH-01-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	32KE0201-SH-01-A	July 17, 2012	-	-

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SECTION 1: Customer information

Company Name	:	Sony Corporation
Address	:	Shinagawa INTERCITY C Tower 2-15-3, Konan Minato-ku, Tokyo, Japan
Telephone Number	:	+81-3-5769-5640
Facsimile Number	:	+81-3-5769-5901
Contact Person	:	Maeda Toshihiro

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

2.1 Identification of E.U.T.

Type of Equipment	:	Bluetooth Audio System
Model Number	:	MEX-GS600BT
Serial Number	:	Refer to clause 4.2
Rating	:	DC12V
Country of Mass-production	:	Thailand
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample	:	June 26, 2012
Modification of EUT	:	No modification by the test lab.

2.2 Product description

Model: MEX-GS600BT (referred to as the EUT in this report) is a Bluetooth Audio System.

Clock frequency(ies) in the system : 36.48MHz, 24.000 MHz, 16.934MHz, 12MHz, 7.920MHz, 32.768kHz

Bluetooth specification:

Equipment type	:	Transceiver
Frequency of operation	:	2402-2480MHz
Bandwidth & channel spacing	:	79MHz & 1MHz
Type of modulation	:	FHSS
Antenna type	:	Inverted F
Antenna connector type	:	U-FL
Antenna gain with cable loss	:	-4.9dBi
ITU code	:	F1D, G1D
Operation temperature range	:	-20 to +60 deg.C.

FCC 15.31 (e)
The equipment provides the Bluetooth transmitter with stable power supply (DC 3.3 V), therefore, the equipment complies with power supply regulation.

FCC 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.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2012, final revised on May 17, 2012 and effective June 18, 2012
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

The EUT complies with FCC Part 15 Subpart B. Refer to the test report: 32KE0201-SH-01-C.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	N/A	N/A
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A	*See data.	Complied
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A		-
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (b)(1)	Conducted	N/A		Complied
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (d) 15.209	Conducted/ Radiated	N/A	3.6dB Freq.: 213.238MHz Polarization: Horizontal Detection: Quasi-Peak Mode: Tx 2402MHz, DH5 Freq.: 202.157MHz Polarization: Horizontal Detection: Quasi-Peak Mode: Tx 2441MHz, 3DH5	Complied

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.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 4.6.1	-	Conducted	-	-
Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422					

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

3.4 Uncertainty

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

Item	Frequency range	No.1 SAC*1 (±)	No.2 SAC (±)	No.3 SAC (±)
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-15GHz	4.8 dB	4.8 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.8 dB	4.3 dB	4.4 dB

*1: SAC=Semi-Anechoic Chamber

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: (±) 1.5dB
Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.7dB
Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB
Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB
Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.9dB
Bandwidth measurement uncertainty for this test was: (±) 5.4%

3.5 Test location

UL Japan, Inc. Shonan EMC Lab.
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Telephone number : +81 463 50 6400
Facsimile number : +81 463 50 6401
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
☒ No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 Full-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☒ No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating mode

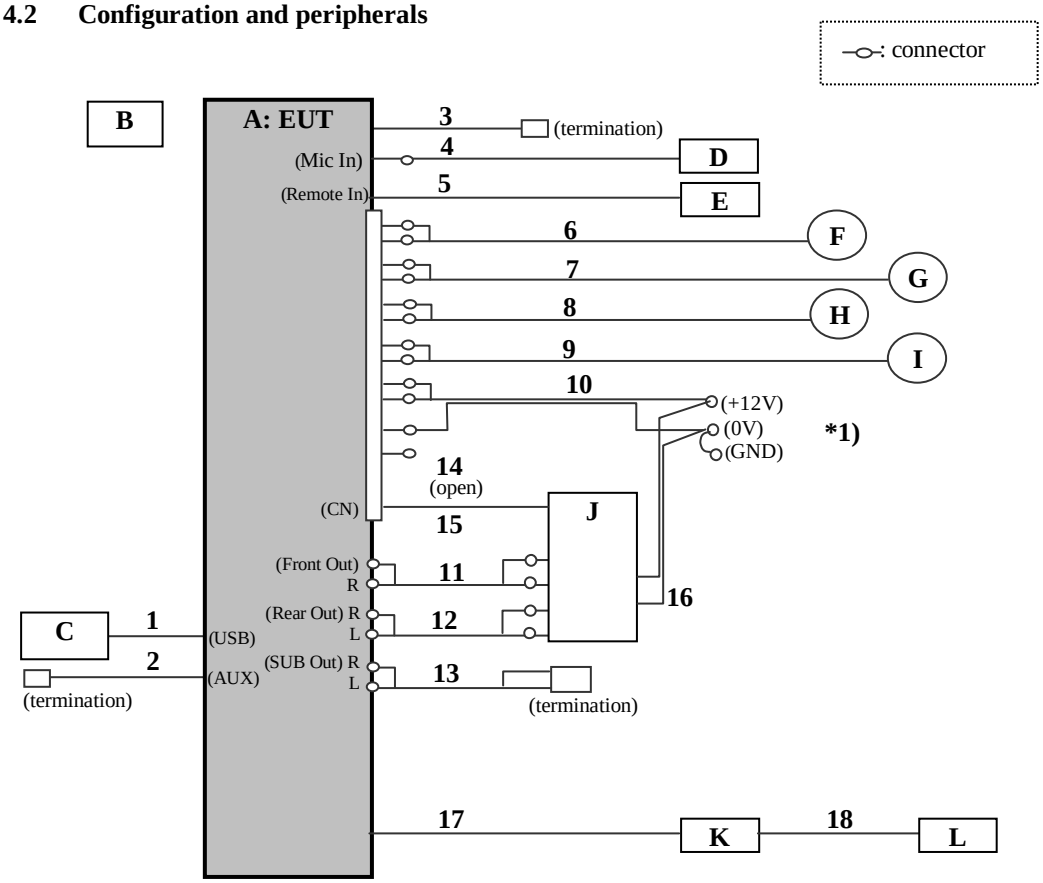
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Operating mode	Tested frequency
Carrier frequency separation	Transmitting Hopping ON (DH5/3DH5)/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 Spurious emission:
(Radiated)	Transmitting (DH5/3DH5), Payload: PRBS9	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 affect the output power and bandwidth of the EUT.
As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

EUT has the power settings by the software as follows;
Power settings: BDR: Ext.=255, Int.=44
EDR: Ext.=255, Int.=48
Software: BtCli.exe Version 1.24 (for Inquiry mode), BlueTest.exe Version 1.24 (for other mode)

4.2 Configuration and peripherals



* Cabling and setup were taken into consideration and test data was taken under worse case conditions.

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

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Bluetooth Audio System	MEX-GS600BT	*2)	Sony	EUT
B	Remote Commander	RM-X231	-	Sony	-
C	USB Memory	SDK-USM4GL(B)	10615MEDB	Sony	-
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	Stereo Power Amplifier	XM-423SL	0020316	Sony	-
K	SIRIUS XM Connector Vehicle Tuner	SXV100	1113	SIRIUS	-
L	Antenna	XVANT1	1046	SIRIUS	-

*2) 32: for Antenna terminal conducted tests, 33: for Radiated emission tests

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	USB	2.0	Shielded	Shielded	-
2	AUX	3.0	Shielded	Shielded	-
3	FM antenna	1.1	Shielded	Shielded	-
4	External Microphone	0.25+4.0	Shielded	Shielded	-
5	REMOTE IN	1.9	Shielded	Shielded	-
6	Speaker (1)	0.25+2.0	Unshielded	Unshielded	-
7	Speaker (2)	0.25+2.0	Unshielded	Unshielded	-
8	Speaker (3)	0.25+2.0	Unshielded	Unshielded	-
9	Speaker (4)	0.25+2.0	Unshielded	Unshielded	-
10	DC Power	1.5	Unshielded	Unshielded	-
11	RCA (Front Audio Out)	5.0	Shielded	Shielded	-
12	RCA (Rear Audio Out)	5.0	Shielded	Shielded	-
13	RCA (Sub Audi Out)	1.5	Shielded	Shielded	-
14	Illumination	3.0	Unshielded	Unshielded	-
15	AMP Remote	3.0	Unshielded	Unshielded	-
16	DC Power	0.7+0.7	Unshielded	Unshielded	-
17	Sirius Tuner	0.8	Shielded	Shielded	-
18	Sirius Antenna	6.8	Shielded	Shielded	-

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

SECTION 5: Carrier frequency separation

Test procedure
The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 6: 20dB bandwidth & Occupied bandwidth (99%)

Test procedure
The bandwidth was measured with a spectrum analyzer connected to the antenna port.
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 7: Number of hopping frequency

Test procedure
The number of hopping frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 8: Dwell time

Test procedure
The dwell time was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 9: Maximum peak output power

Test procedure
The maximum peak output power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 10: Spurious emissions (Radiated)

10.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 2)
Humidity : See test data (APPENDIX 2)

10.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of EUT 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 0.3 to 0.4m long and were hanged at a 0.4m height to the ground plane. Photographs of the set up are shown in Appendix 1.

10.3 Test conditions

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

10.4 Test procedure

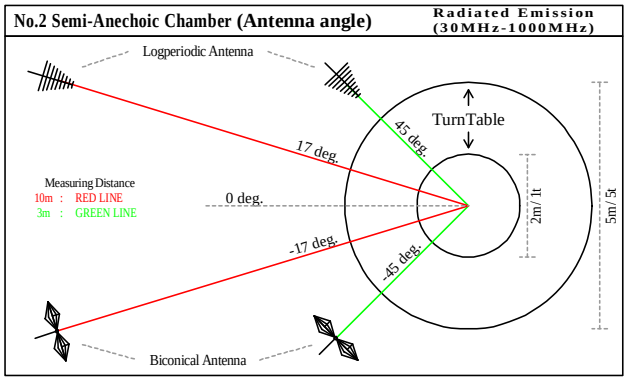
The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m (below 15GHz) / 1m (above 15GHz) (Refer to Figure 1). Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.
The radiated emission measurements were made with the following detection of the test receiver.

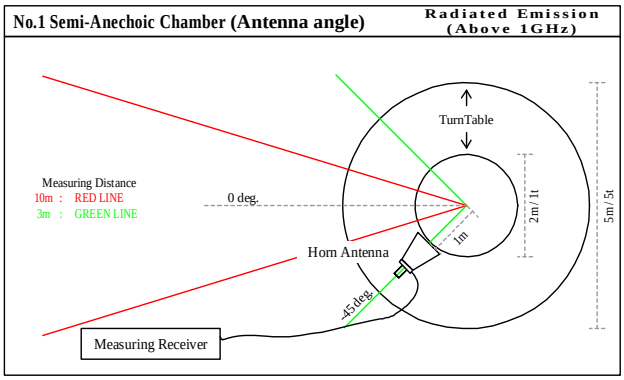
Frequency		30 - 1000MHz	1 - 25GHz	
Detection Type	:	Quasi-Peak	Peak	* Average
IF Bandwidth	:	120kHz	RBW:1MHz/VBW:3MHz	RBW:1MHz/VBW:10Hz

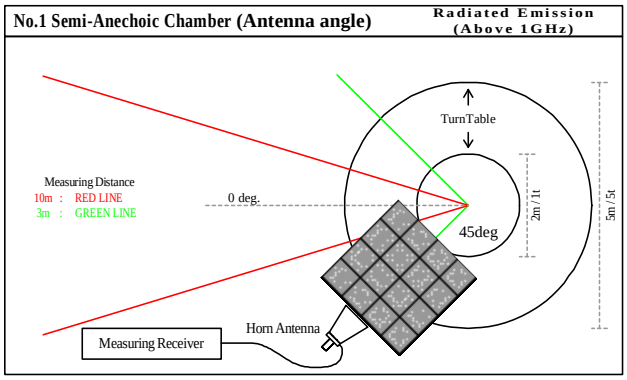
* When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.
Although 00-705 accepts VBW=10Hz for AV measurements, confirmed that superfluous smoothing was not performed.

The carrier level and noise levels were confirmed at angle of 0 to 45 deg. based on the product specification to see the position of maximum noise, and the test was made at the position (0 deg.) that has the maximum noise.

Figure 1. Antenna angle







10.5 Band edge

Band edge level is below the limits of FCC 15.209. Refer to the data.

10.6 Results

Summary of the test results : Pass *No harmonics other than listed on the data were detected.

Refer to APPENDIX 1

SECTION 11: Spurious emissions (Antenna port conducted)

Test procedure
The spurious missions 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

Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

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

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Radiated emission

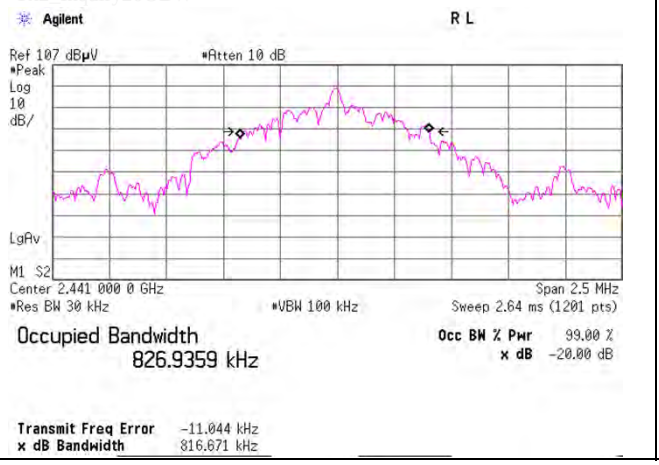
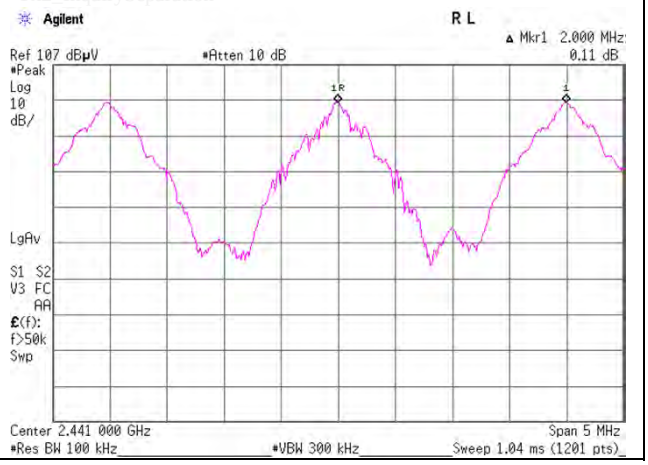
APPENDIX 1: Data of radio tests

20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2012/6/26	
Temperature / Humidity	23 deg.C , 46 %RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.941	1.000	>= 0.627
DH5	2441.0	0.930	1.000	>= 0.620
DH5	2480.0	0.948	1.000	>= 0.632
Inquiry	2441.0	0.817	2.000	>= 0.544

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

Inquiry	
20dB Bandwidth	**Carrier Frequency Separation**
Tx, 2441MHz	**Tx, 2441MHz**
	

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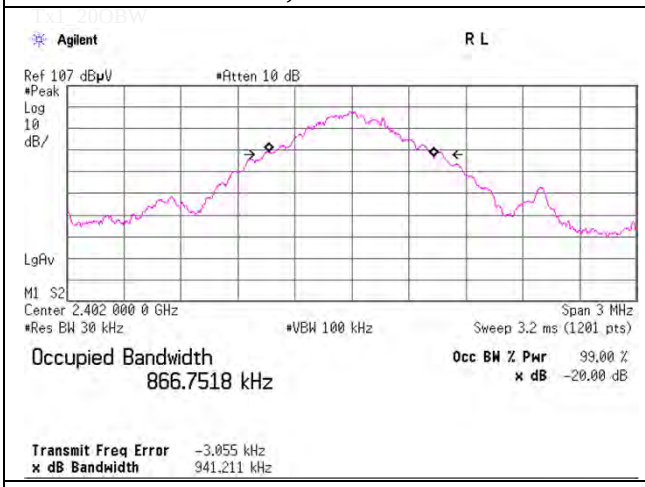
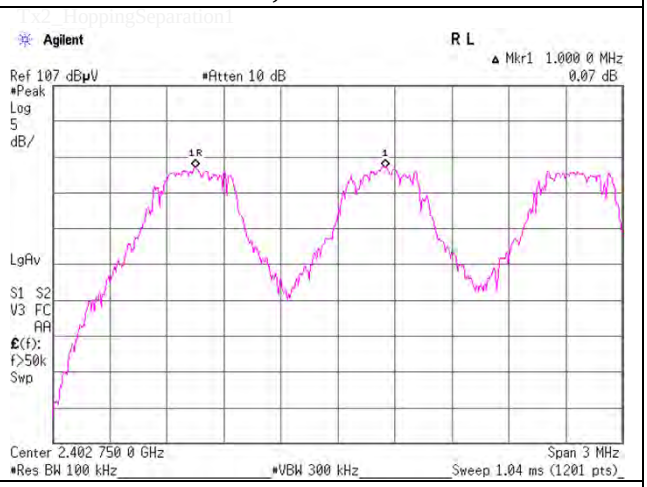
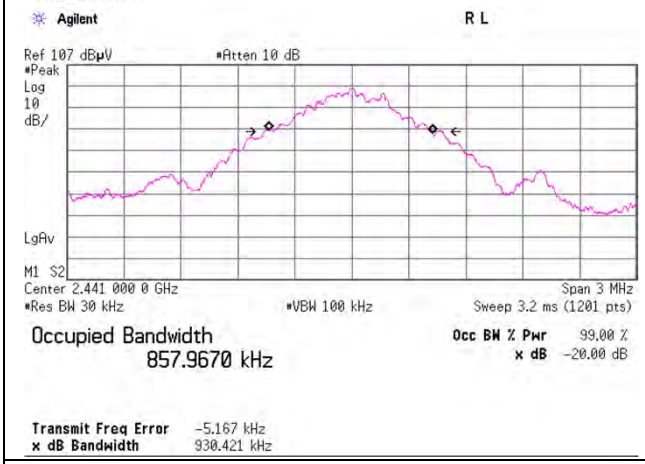
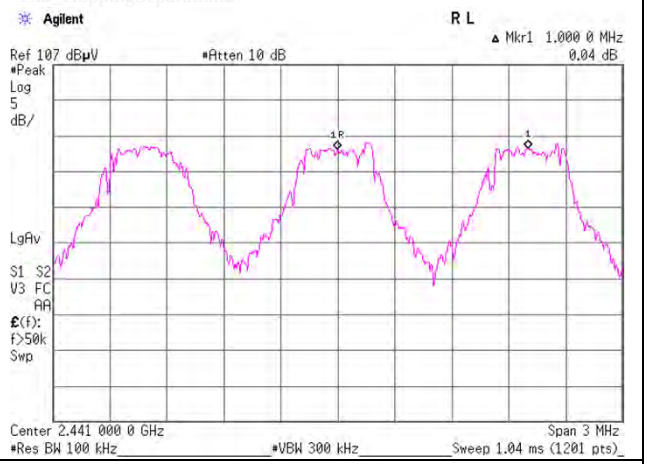
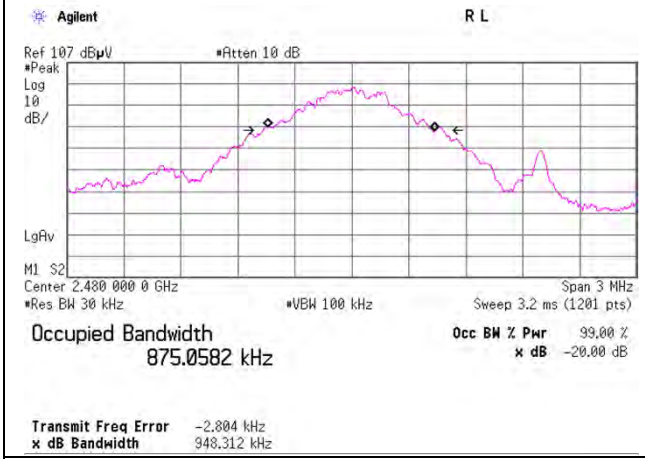
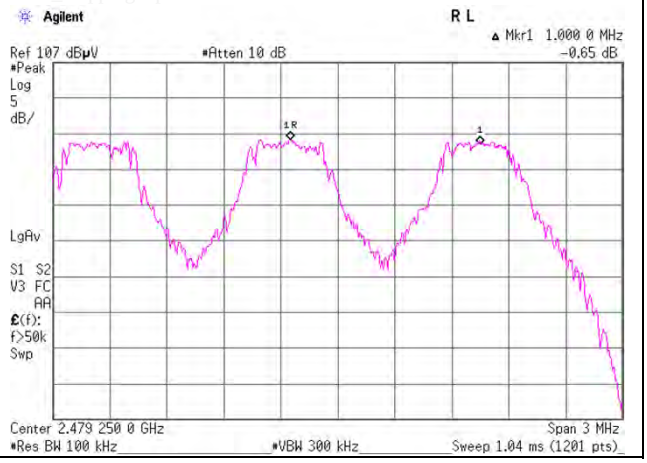
20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9

20dB Bandwidth	Carrier Frequency Separation
Tx, 2402MHz	**Tx, 2402MHz**
	
Tx, 2441MHz	**Tx, 2441MHz**
	
Tx, 2480MHz	**Tx, 2480MHz**
	

20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2012/6/26	
Temperature / Humidity	23 deg.C , 46 %RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth, EDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.270	1.000	>= 0.847
3-DH5	2441.0	1.292	1.000	>= 0.861
3-DH5	2480.0	1.306	1.000	>= 0.870

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

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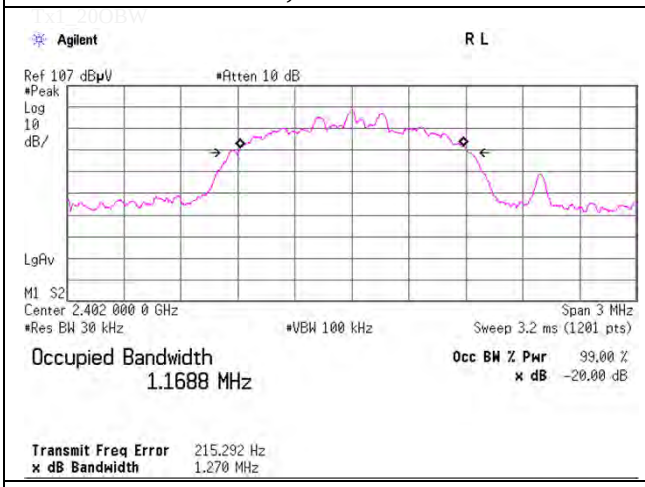
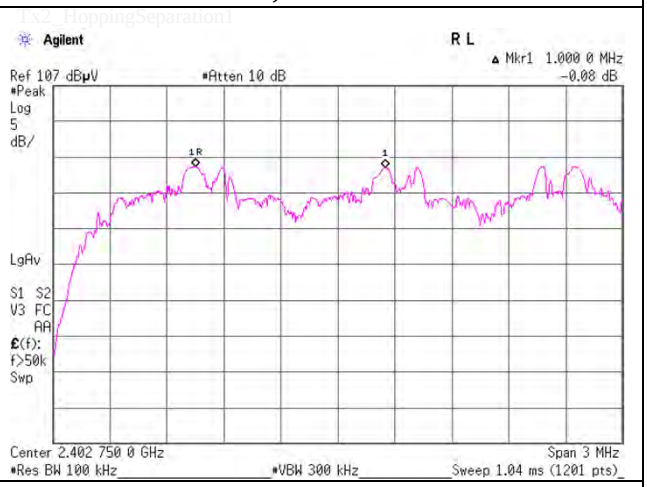
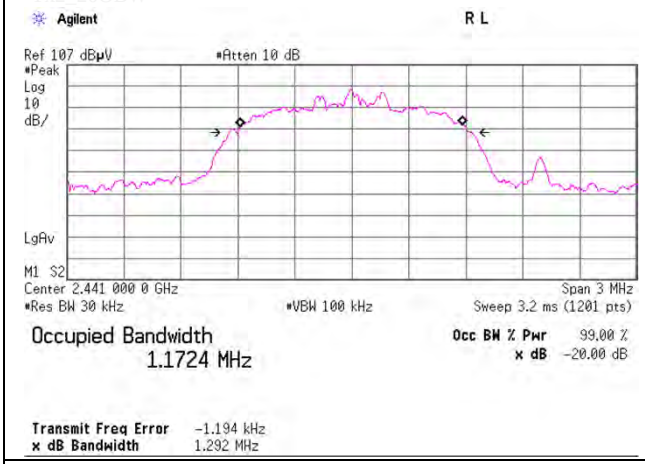
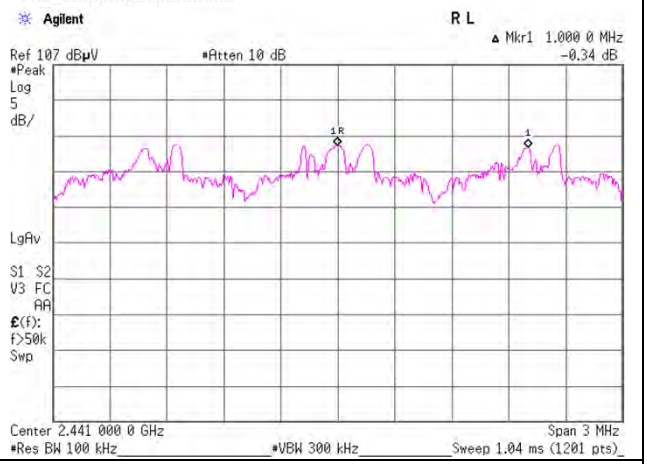
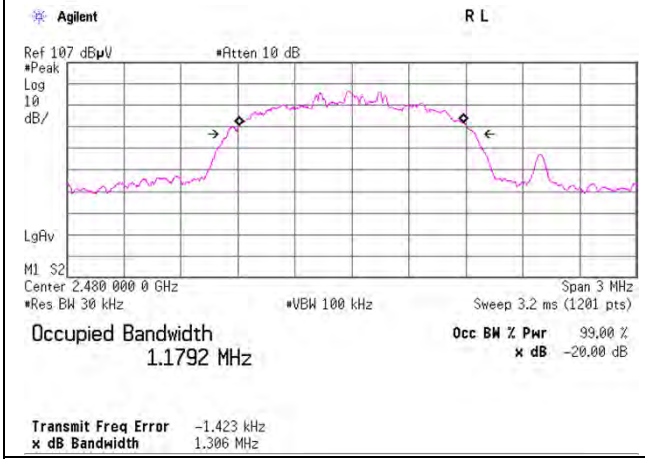
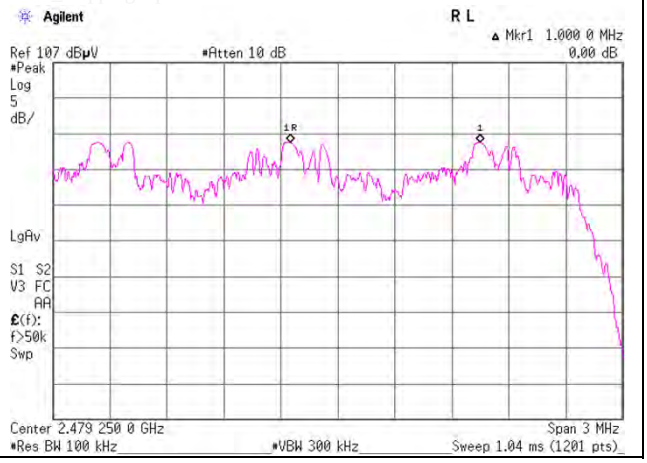
20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9

20dB Bandwidth	Carrier Frequency Separation
Tx, 2402MHz	**Tx, 2402MHz**
	
Tx, 2441MHz	**Tx, 2441MHz**
	
Tx, 2480MHz	**Tx, 2480MHz**
	

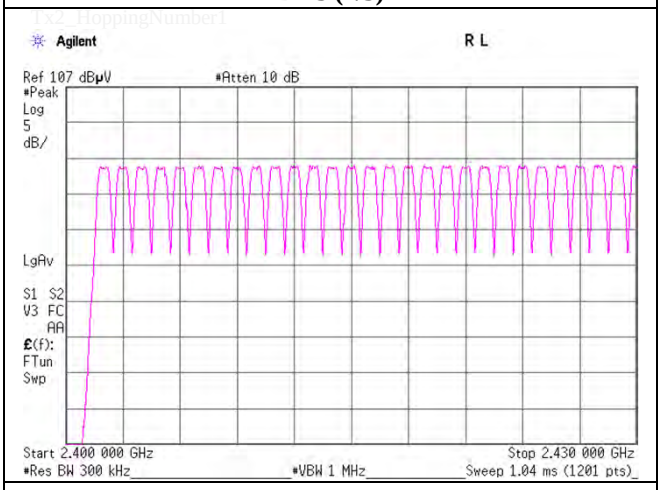
Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2012/6/26	
Temperature / Humidity	23 deg.C , 46 %RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth, BDR, PRBS9	

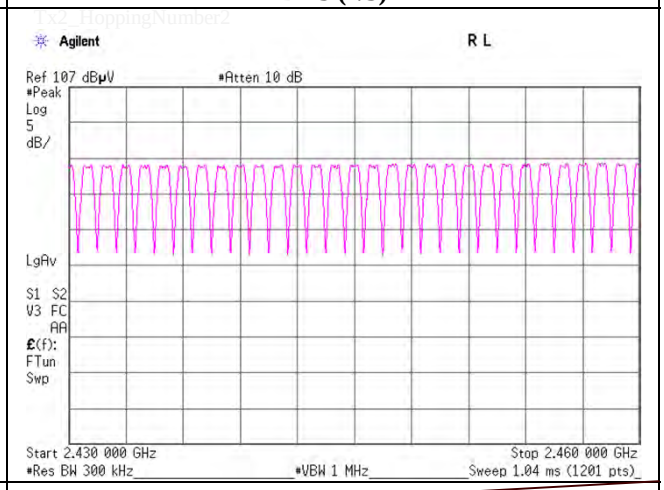
Mode	Number of Channel [times]	Limit [times]
DH5	79	>= 15

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

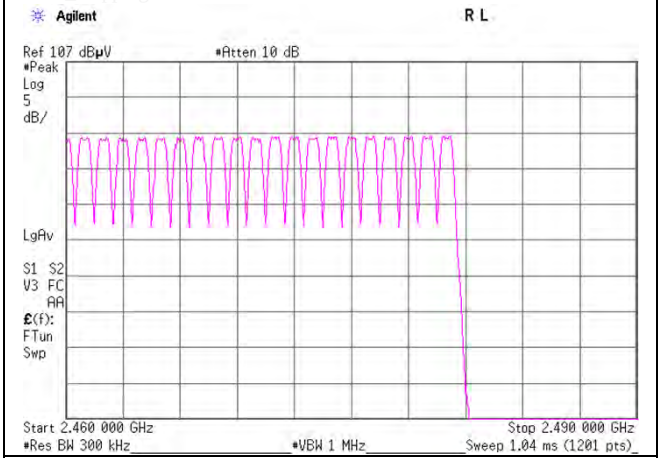
DH5 (1/3)



DH5 (2/3)



DH5 (3/3)



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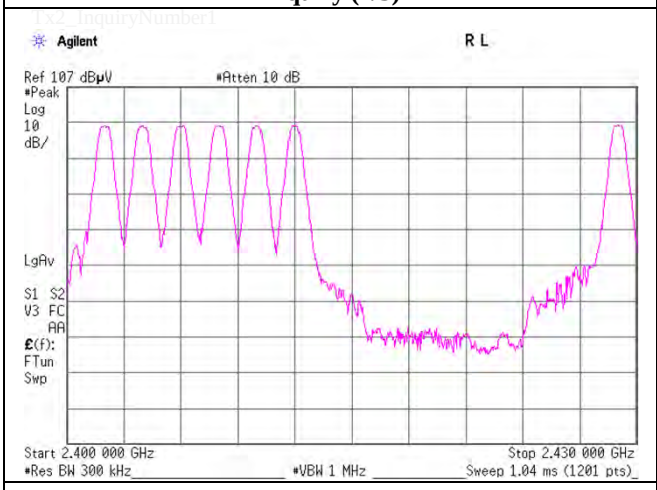
Number of Hopping Frequency

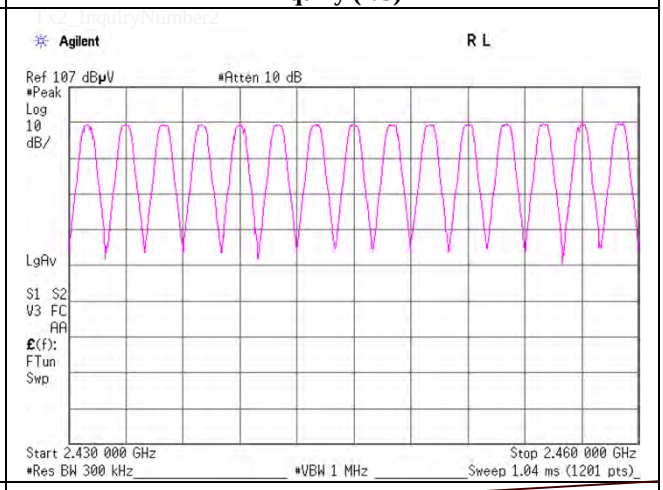
Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2012/6/26	
Temperature / Humidity	23 deg.C , 46 %RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth, Inquiry	

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

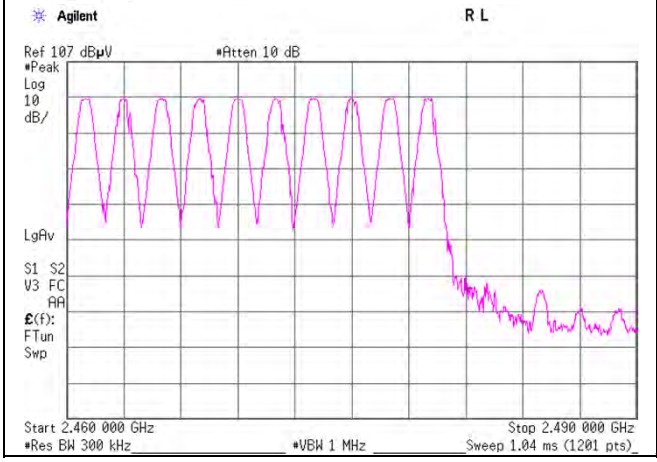
Inquiry (1/3)



Inquiry (2/3)



Inquiry (3/3)



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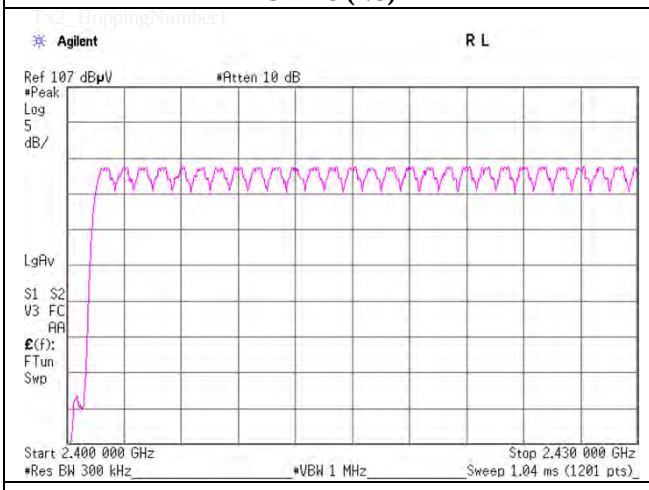
Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2012/6/26	
Temperature / Humidity	23 deg.C , 46 %RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth, EDR, PRBS9	

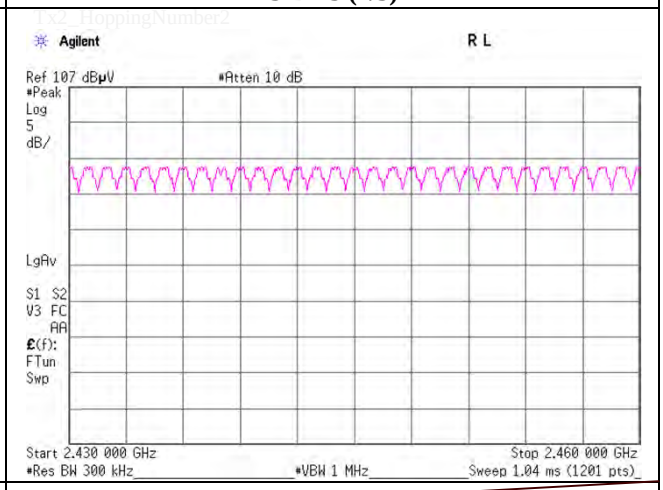
Mode	Number of Channel [times]	Limit [times]
3-DH5	79	>= 15

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

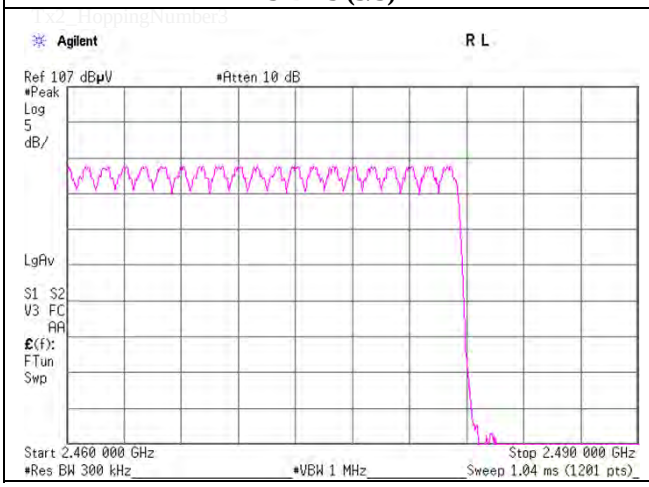
3-DH5 (1/3)



3-DH5 (2/3)



3-DH5 (3/3)



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Dwell Time

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2012/6/26	
Temperature / Humidity	23 deg.C , 46 %RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period	Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.0 / 5.0 sec. x 31.6 sec. = 316 times	0.403	127	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.659	274	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.908	314	400
Inquiry	100.0 / 1.0 sec. x 12.8 sec. = 1280 times	0.105	135	400

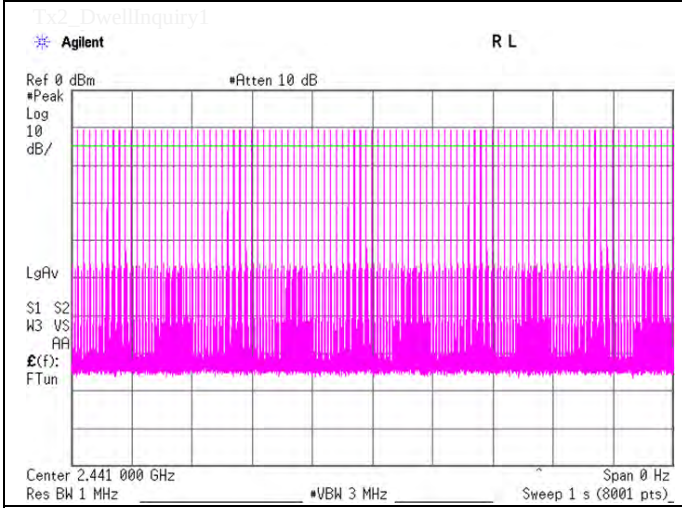
Sample Calculation

Result = Number of transmission x Length of transmition time

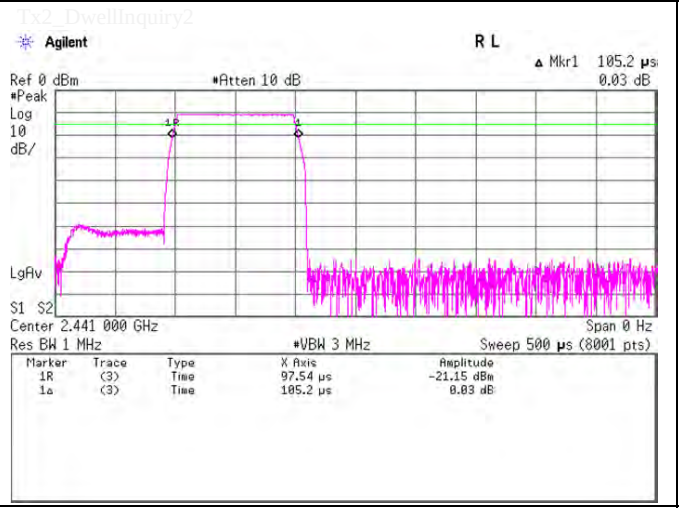
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s regardless of packet size (DH1, DH3 or DH5). This is confirmed in the test report for N=79.

Inquiry

Inquiry (1/2)



Inquiry (2/2)



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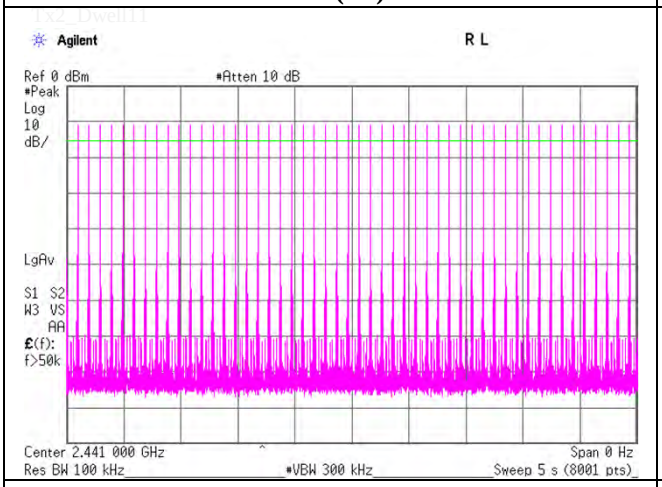
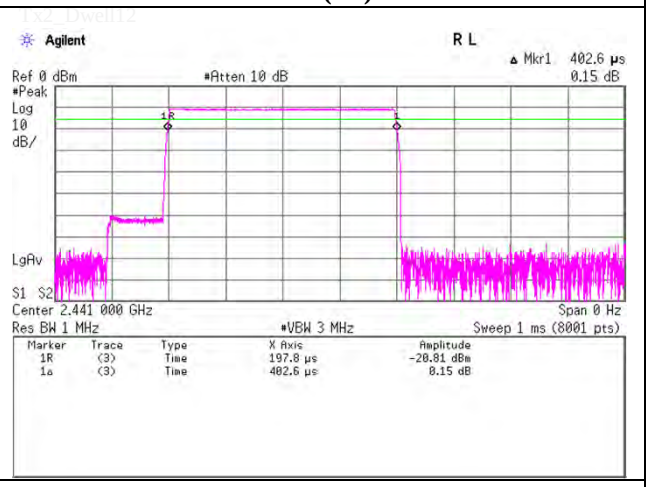
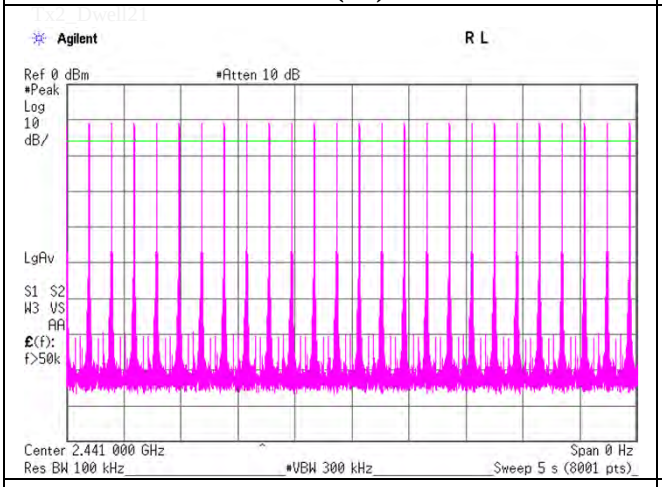
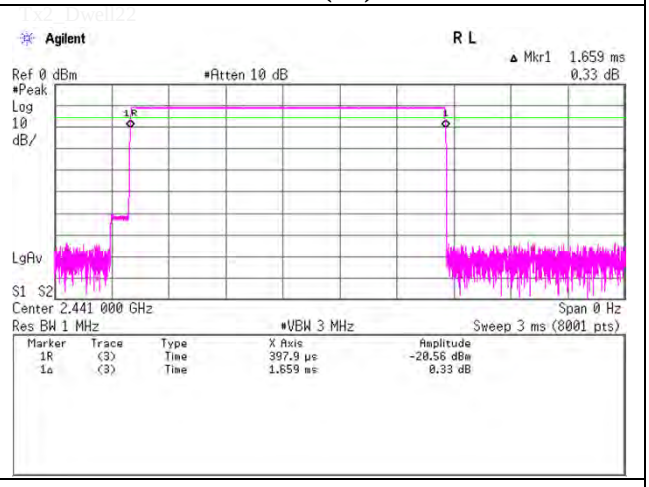
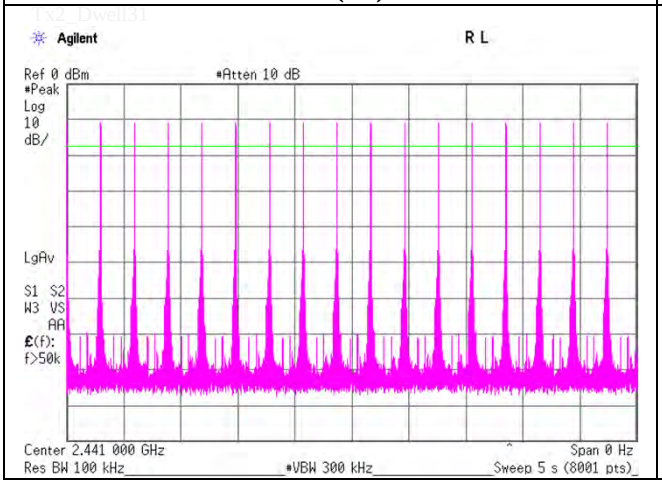
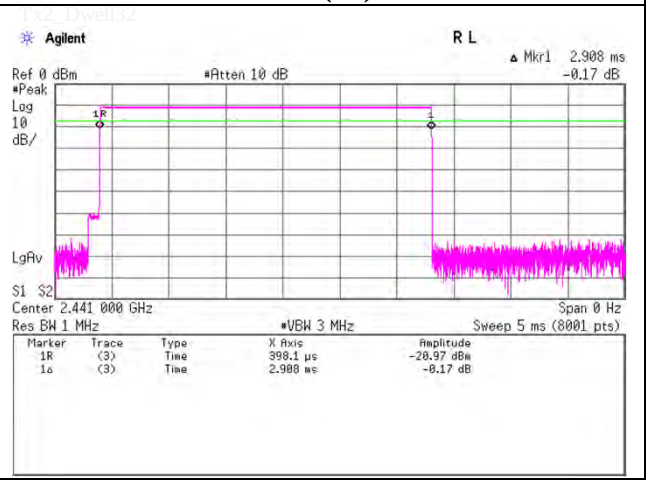
Dwell time

Tx, Bluetooth, BDR, PRBS9

DH1 (1/2)	DH1 (2/2)
	
DH3 (1/2)	**DH3 (2/2)**
	
DH5 (1/2)	**DH5 (2/2)**
	

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Dwell Time

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2012/6/26	
Temperature / Humidity	23 deg.C , 46 %RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth, EDR, PRBS9	

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4)	Length of transmission time [msec]	Result [msec]	Limit [msec]
3-DH1	50.0 / 5.0 sec. x 31.6 sec. = 316 times	0.417	132	400
3-DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.667	275	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 transmition time

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s regardless of packet size (3DH1, 3DH3 or 3DH5). This is confirmed in the test report for N=79.

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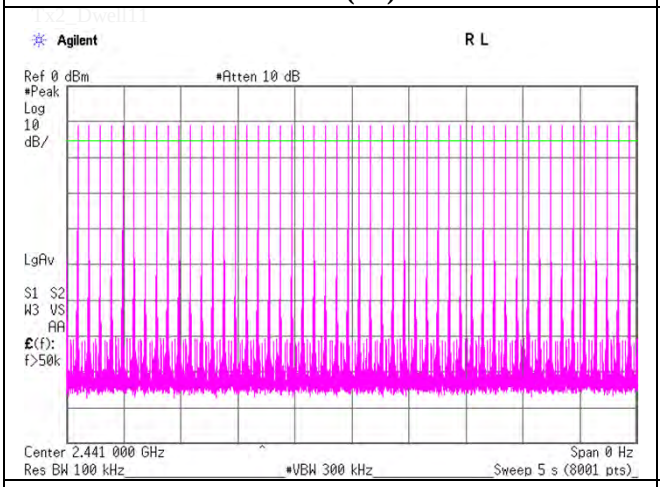
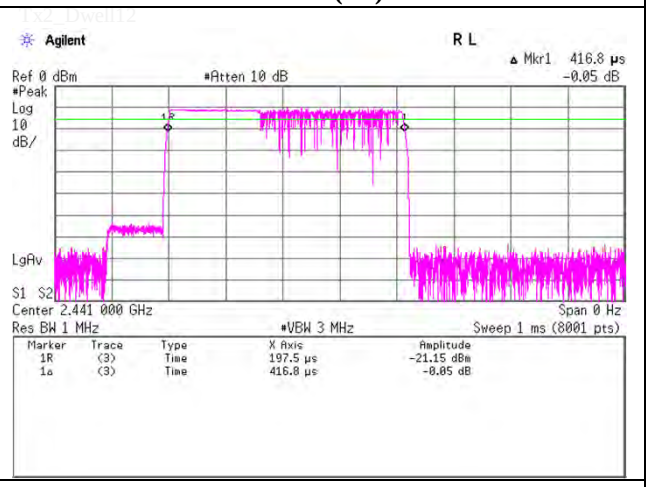
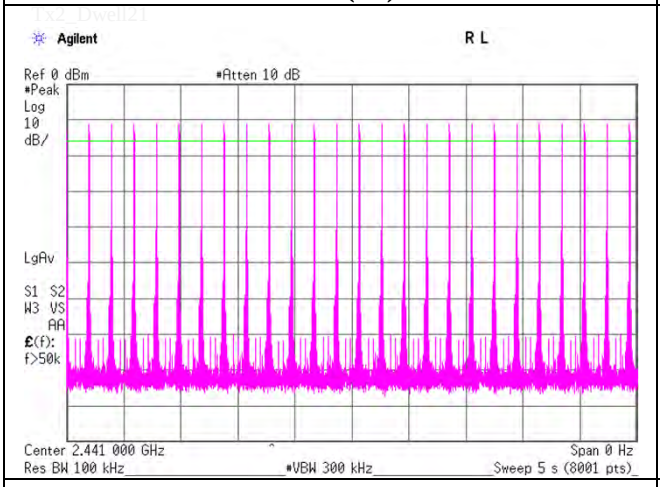
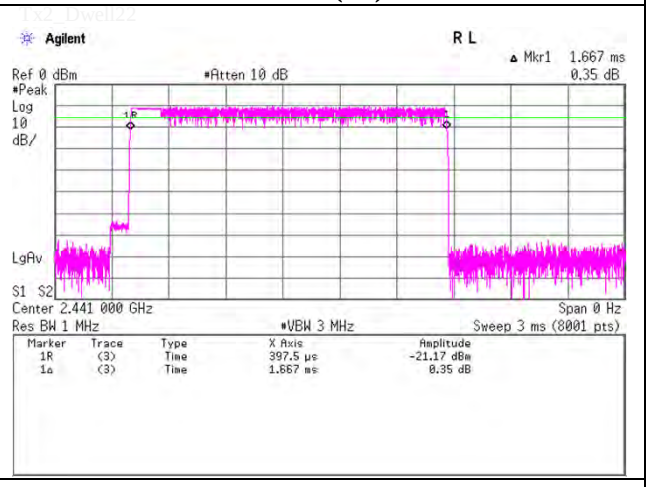
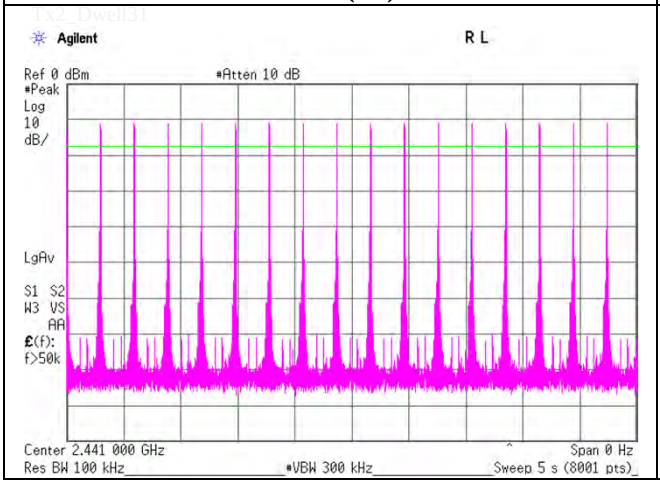
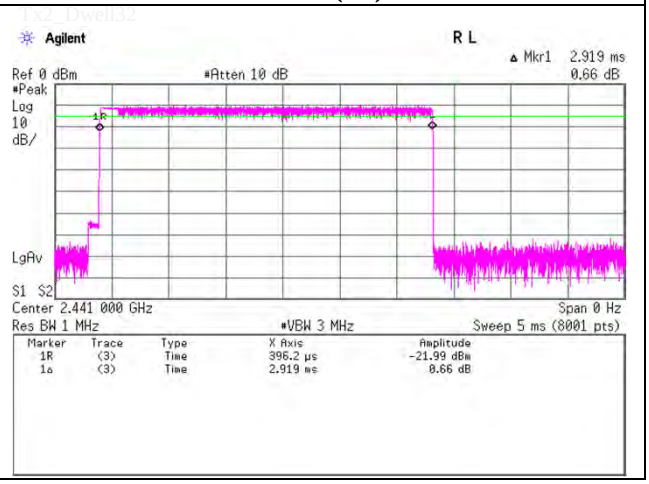
Dwell time

Tx, Bluetooth, EDR, PRBS9

3-DH1 (1/2)	3-DH1 (2/2)
	
3-DH3 (1/2)	**3-DH3 (2/2)**
	
3-DH5 (1/2)	**3-DH5 (2/2)**
	

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Peak Output Power (Conducted)

Test place	UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date	2012/6/26
Temperature / Humidity	23 deg.C , 46 %RH
Engineer	Makoto Hosaka
Mode	Tx, Bluetooth

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

	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-10.85	1.55	9.68	0.38	1.09	20.97	125	20.59
DH5	2441.0	-10.46	1.56	9.68	0.78	1.20	20.97	125	20.19
DH5	2480.0	-10.10	1.57	9.68	1.15	1.30	20.97	125	19.82
2-DH5	2402.0	-10.36	1.55	9.68	0.87	1.22	20.97	125	20.10
2-DH5	2441.0	-10.17	1.56	9.68	1.07	1.28	20.97	125	19.90
2-DH5	2480.0	-10.08	1.57	9.68	1.17	1.31	20.97	125	19.80
3-DH5	2402.0	-10.23	1.55	9.68	1.00	1.26	20.97	125	19.97
3-DH5	2441.0	-10.01	1.56	9.68	1.23	1.33	20.97	125	19.74
3-DH5	2480.0	-9.91	1.57	9.68	1.34	1.36	20.97	125	19.63

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

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test room	No.1 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	June 29, 2012	July 3, 2012
Temperature / Humidity	23 deg.C , 55 %RH	20 deg.C , 55 %RH
Engineer	Hikaru Shirasawa	Hikaru Shirasawa
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.	191.085	QP	45.4	16.2	9.1	31.8	38.9	43.5	4.6	150	46	PK:VBW 3MHz
Hori.	196.619	QP	44.9	16.4	9.2	31.8	38.7	43.5	4.8	200	218	AV:VBW 10Hz
Hori.	213.238	QP	45.5	16.6	9.6	31.8	39.9	43.5	3.6	150	45	
Hori.	218.776	QP	45.1	16.7	9.7	31.8	39.7	46	6.3	150	38	
Hori.	304.676	QP	46.6	14.2	7	31.7	36.1	46	9.9	100	7	
Hori.	1602.281	PK	49.5	25.4	13.2	40.8	47.3	73.9	26.6	100	171	
Hori.	2390	PK	47.2	28.2	13.9	40.7	48.6	73.9	25.3	101	185	
Hori.	2399.289	PK	55.2	28.2	13.9	40.7	56.6	73.9	17.3	101	185	
Hori.	2400	PK	55.8	28.2	13.9	40.7	57.2	73.9	16.7	101	185	
Hori.	4804	PK	53.1	31.2	6.4	41.6	49.1	73.9	24.8	101	161	
Hori.	7206	PK	48.9	36.1	7.7	41.2	51.5	73.9	22.4	100	0	
Hori.	9608	PK	47.6	38.6	8.8	40.4	54.6	73.9	19.3	100	0	
Hori.	12010	PK	46.4	39.5	10.1	39.4	56.6	73.9	17.3	100	0	
Hori.	1602.281	AV	41.1	25.4	13.2	40.8	38.9	53.9	15	100	171	
Hori.	2390	AV	34.2	28.2	13.9	40.7	35.6	53.9	18.3	101	185	
Hori.	2399.289	AV	41.3	28.2	13.9	40.7	42.7	53.9	11.2	101	185	
Hori.	2400	AV	37.1	28.2	13.9	40.7	38.5	53.9	15.4	101	185	
Hori.	4804	AV	43.4	31.2	6.4	41.6	39.4	53.9	14.5	101	161	
Hori.	7206	AV	35.6	36.1	7.7	41.2	38.2	53.9	15.7	100	0	
Hori.	9608	AV	34.7	38.6	8.8	40.4	41.7	53.9	12.2	100	0	
Hori.	12010	AV	34.3	39.5	10.1	39.4	44.5	53.9	9.4	100	0	
Vert.	41.596	QP	42	14.1	7.1	31.9	31.3	40	8.7	100	350	
Vert.	372.385	QP	35.2	15.8	7.4	31.7	26.7	46	19.3	100	268	
Vert.	1602.078	PK	48.9	25.4	13.2	40.8	46.7	73.9	27.2	100	349	
Vert.	2390	PK	46.9	28.2	13.9	40.7	48.3	73.9	25.6	100	272	
Vert.	2399.17	PK	54.8	28.2	13.9	40.7	56.2	73.9	17.7	100	272	
Vert.	2400	PK	56.8	28.2	13.9	40.7	58.2	73.9	15.7	100	272	
Vert.	4804	PK	52.3	31.2	6.4	41.6	48.3	73.9	25.6	100	30	
Vert.	7206	PK	48.6	36.1	7.7	41.2	51.2	73.9	22.7	100	0	
Vert.	9608	PK	47.1	38.6	8.8	40.4	54.1	73.9	19.8	100	0	
Vert.	12010	PK	46.2	39.5	10.1	39.4	56.4	73.9	17.5	100	0	
Vert.	1602.078	AV	40.6	25.4	13.2	40.8	38.4	53.9	15.5	100	349	
Vert.	2390	AV	34.6	28.2	13.9	40.7	36	53.9	17.9	100	272	
Vert.	2399.17	AV	40.6	28.2	13.9	40.7	42	53.9	11.9	100	272	
Vert.	2400	AV	37.5	28.2	13.9	40.7	38.9	53.9	15	100	272	
Vert.	4804	AV	42.7	31.2	6.4	41.6	38.7	53.9	15.2	100	30	
Vert.	7206	AV	35.3	36.1	7.7	41.2	37.9	53.9	16	100	0	
Vert.	9608	AV	34.4	38.6	8.8	40.4	41.4	53.9	12.5	100	0	
Vert.	12010	AV	34.4	39.5	10.1	39.4	44.6	53.9	9.3	100	0	

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

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

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

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test room	No.1 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	June 29, 2012	July 3, 2012
Temperature / Humidity	23 deg.C , 55 %RH	20 deg.C , 55 %RH
Engineer	Hikaru Shirasawa	Hikaru Shirasawa
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.	41.905	QP	33.4	13.9	7.1	31.9	22.5	40	17.5	150	108	PK:VBW 3MHz
Hori.	180	QP	42.9	15.9	9	31.8	36	43.5	7.5	150	98	AV:VBW 10Hz
Hori.	196.617	QP	44.6	16.4	9.2	31.8	38.4	43.5	**5.1**	169	26	
Hori.	213.229	QP	44	16.6	9.6	31.8	38.4	43.5	**5.1**	150	307	
Hori.	373.82	QP	43.6	15.8	7.4	31.7	35.1	46	10.9	100	358	
Hori.	1626.512	PK	49.5	25.5	13.2	40.8	47.4	73.9	26.5	100	167	
Hori.	4882	PK	50.8	31.4	6.4	41.5	47.1	73.9	26.8	102	48	
Hori.	7323	PK	47.7	36.2	8.1	41.2	50.8	73.9	23.1	100	0	
Hori.	9764	PK	46.8	38.7	8.9	40.4	54	73.9	19.9	100	0	
Hori.	12205	PK	46.5	39.6	10.2	39.2	57.1	73.9	16.8	100	0	
Hori.	1626.512	AV	40.6	25.5	13.2	40.8	38.5	53.9	15.4	100	167	
Hori.	4882	AV	40.7	31.4	6.4	41.5	37	53.9	16.9	102	48	
Hori.	7323	AV	35.3	36.2	8.1	41.2	38.4	53.9	15.5	100	0	
Hori.	9764	AV	34.6	38.7	8.9	40.4	41.8	53.9	12.1	100	0	
Hori.	12205	AV	33.4	39.6	10.2	39.2	44	53.9	9.9	100	0	
Vert.	152.312	QP	38.8	15	8.8	31.8	30.8	43.5	12.7	100	133	
Vert.	379.374	QP	36	15.9	7.5	31.7	27.7	46	18.3	100	13	
Vert.	1626.874	PK	49.3	25.5	13.2	40.8	47.2	73.9	26.7	100	236	
Vert.	4882	PK	51.3	31.4	6.4	41.5	47.6	73.9	26.3	102	282	
Vert.	7323	PK	47.5	36.2	8.1	41.2	50.6	73.9	23.3	100	0	
Vert.	9764	PK	46.7	38.7	8.9	40.4	53.9	73.9	20	100	0	
Vert.	12205	PK	45.5	39.6	10.2	39.2	56.1	73.9	17.8	100	0	
Vert.	1626.874	AV	41.7	25.5	13.2	40.8	39.6	53.9	14.3	100	236	
Vert.	4882	AV	40.2	31.4	6.4	41.5	36.5	53.9	17.4	102	282	
Vert.	7323	AV	35.6	36.2	8.1	41.2	38.7	53.9	15.2	100	0	
Vert.	9764	AV	34.5	38.7	8.9	40.4	41.7	53.9	12.2	100	0	
Vert.	12205	AV	33.2	39.6	10.2	39.2	43.8	53.9	10.1	100	0	

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

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

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Facsimile : +81 463 50 6401

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test room	No.1 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	June 29, 2012	July 3, 2012
Temperature / Humidity	23 deg.C , 55 %RH	20 deg.C , 55 %RH
Engineer	Hikaru Shirasawa	Hikaru Shirasawa
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.	41.058	QP	32.6	14.3	7	31.9	22	40	18	300	116	PK:VBW 3MHz
Hori.	196.616	QP	44	16.4	9.2	31.8	37.8	43.5	5.7	145	242	AV:VBW 10Hz
Hori.	202.163	QP	45	16.5	9.4	31.8	39.1	43.5	**4.4**	150	239	
Hori.	207.69	QP	43.8	16.6	9.5	31.8	38.1	43.5	5.4	150	242	
Hori.	213.235	QP	43.7	16.6	9.6	31.8	38.1	43.5	5.4	150	280	
Hori.	362.776	QP	45.2	15.6	7.4	31.7	36.5	46	9.5	100	343	
Hori.	1652.665	PK	49.7	25.5	13.2	40.8	47.6	73.9	26.3	100	219	
Hori.	2483.5	PK	50.2	28.7	14	40.7	52.2	73.9	21.7	103	180	
Hori.	4960	PK	49.5	31.6	6.5	41.4	46.2	73.9	27.7	102	90	
Hori.	7440	PK	47.9	36.3	8.2	41.3	51.1	73.9	22.8	100	0	
Hori.	9920	PK	47.4	38.9	9	40.3	55	73.9	18.9	100	0	
Hori.	12400	PK	46.1	39.7	10.3	39	57.1	73.9	16.8	100	0	
Hori.	1652.665	AV	41.5	25.5	13.2	40.8	39.4	53.9	14.5	100	219	
Hori.	2483.5	AV	34.6	28.7	14	40.7	36.6	53.9	17.3	103	180	
Hori.	4960	AV	38.9	31.6	6.5	41.4	35.6	53.9	18.3	102	90	
Hori.	7440	AV	35.4	36.3	8.2	41.3	38.6	53.9	15.3	100	0	
Hori.	9920	AV	34.4	38.9	9	40.3	42	53.9	11.9	100	0	
Hori.	12400	AV	32.8	39.7	10.3	39	43.8	53.9	10.1	100	0	
Vert.	41.532	QP	42	14.2	7.1	31.9	31.4	40	8.6	100	353	
Vert.	346.164	QP	35.5	15.2	7.3	31.7	26.3	46	19.7	100	247	
Vert.	1653.545	PK	48.9	25.5	13.2	40.8	46.8	73.9	27.1	100	307	
Vert.	2483.5	PK	48.6	28.7	14	40.7	50.6	73.9	23.3	100	313	
Vert.	4960	PK	50.8	31.6	6.5	41.4	47.5	73.9	26.4	100	58	
Vert.	7440	PK	47.5	36.3	8.2	41.3	50.7	73.9	23.2	100	0	
Vert.	9920	PK	47.5	38.9	9	40.3	55.1	73.9	18.8	100	0	
Vert.	12400	PK	45.8	39.7	10.3	39	56.8	73.9	17.1	100	0	
Vert.	1653.545	AV	40.3	25.5	13.2	40.8	38.2	53.9	15.7	100	307	
Vert.	2483.5	AV	34.4	28.7	14	40.7	36.4	53.9	17.5	100	313	
Vert.	4960	AV	39.8	31.6	6.5	41.4	36.5	53.9	17.4	100	58	
Vert.	7440	AV	35.7	36.3	8.2	41.3	38.9	53.9	15	100	0	
Vert.	9920	AV	34.7	38.9	9	40.3	42.3	53.9	11.6	100	0	
Vert.	12400	AV	32.9	39.7	10.3	39	43.9	53.9	10	100	0	

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

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

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test room	No.1 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	June 29, 2012	July 3, 2012
Temperature / Humidity	23 deg.C , 55 %RH	22 deg.C , 54 %RH
Engineer	Hikaru Shirasawa	Hikaru Shirasawa
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.	41.276	QP	34	13.9	7.1	31.9	23.1	40	16.9	300	45	PK:VBW 3MHz
Hori.	168.804	QP	42	15.5	9	31.8	34.7	43.5	8.8	200	225	AV:VBW 10Hz
Hori.	202.213	QP	44.8	16.5	9.4	31.8	38.9	43.5	4.6	150	222	
Hori.	207.638	QP	45	16.6	9.5	31.8	39.3	43.5	**4.2**	200	355	
Hori.	357.241	QP	46.6	15.4	7.3	31.7	37.6	46	8.4	100	6	
Hori.	1601.938	PK	48.8	25.4	13.2	40.8	46.6	73.9	27.3	100	224	
Hori.	2390	PK	46.7	28.2	13.9	40.7	48.1	73.9	25.8	102	150	
Hori.	2400	PK	54.8	28.2	13.9	40.7	56.2	73.9	17.7	102	150	
Hori.	4804	PK	49.1	31.2	6.4	41.6	45.1	73.9	28.8	100	350	
Hori.	7206	PK	48.8	36.1	7.7	41.2	51.4	73.9	22.5	100	0	
Hori.	9608	PK	47.7	38.6	8.8	40.4	54.7	73.9	19.2	100	0	
Hori.	12010	PK	46.4	39.5	10.1	39.4	56.6	73.9	17.3	100	0	
Hori.	1601.938	AV	41.3	25.4	13.2	40.8	39.1	53.9	14.8	100	224	
Hori.	2390	AV	34.1	28.2	13.9	40.7	35.5	53.9	18.4	102	150	
Hori.	2400	AV	38.2	28.2	13.9	40.7	39.6	53.9	14.3	102	150	
Hori.	4804	AV	36.4	31.2	6.4	41.6	32.4	53.9	21.5	100	350	
Hori.	7206	AV	35.9	36.1	7.7	41.2	38.5	53.9	15.4	100	0	
Hori.	9608	AV	34.6	38.6	8.8	40.4	41.6	53.9	12.3	100	0	
Hori.	12010	AV	34.4	39.5	10.1	39.4	44.6	53.9	9.3	100	0	
Vert.	41.571	QP	41.3	14.1	7.1	31.9	30.6	40	9.4	100	333	
Vert.	373.848	QP	39.9	15.8	7.4	31.7	31.4	46	14.6	100	256	
Vert.	1601.134	PK	49.5	25.4	13.2	40.8	47.3	73.9	26.6	100	290	
Vert.	2390	PK	46.9	28.2	13.9	40.7	48.3	73.9	25.6	100	161	
Vert.	2400	PK	56	28.2	13.9	40.7	57.4	73.9	16.5	100	161	
Vert.	4804	PK	49.3	31.2	6.4	41.6	45.3	73.9	28.6	100	11	
Vert.	7206	PK	48.5	36.1	7.7	41.2	51.1	73.9	22.8	100	0	
Vert.	9608	PK	47.2	38.6	8.8	40.4	54.2	73.9	19.7	100	0	
Vert.	12010	PK	46.2	39.5	10.1	39.4	56.4	73.9	17.5	100	0	
Vert.	1601.134	AV	41.7	25.4	13.2	40.8	39.5	53.9	14.4	100	290	
Vert.	2390	AV	34.4	28.2	13.9	40.7	35.8	53.9	18.1	100	161	
Vert.	2400	AV	39.1	28.2	13.9	40.7	40.5	53.9	13.4	100	161	
Vert.	4804	AV	36.8	31.2	6.4	41.6	32.8	53.9	21.1	100	11	
Vert.	7206	AV	35.4	36.1	7.7	41.2	38	53.9	15.9	100	0	
Vert.	9608	AV	34.3	38.6	8.8	40.4	41.3	53.9	12.6	100	0	
Vert.	12010	AV	34.2	39.5	10.1	39.4	44.4	53.9	9.5	100	0	

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

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

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test room	No.1 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	June 29, 2012	July 3, 2012
Temperature / Humidity	23 deg.C , 55 %RH	22 deg.C , 54 %RH
Engineer	Hikaru Shirasawa	Hikaru Shirasawa
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.	41.525	QP	33.9	14.1	7.1	31.9	23.2	40	16.8	300	66	PK:VBW 3MHz
Hori.	202.157	QP	45.8	16.5	9.4	31.8	39.9	43.5	**3.6**	200	56	AV:VBW 10Hz
Hori.	207.694	QP	45.1	16.6	9.5	31.8	39.4	43.5	4.1	150	57	
Hori.	213.231	QP	45.3	16.6	9.6	31.8	39.7	43.5	3.8	150	59	
Hori.	346.158	QP	46.8	15.2	7.3	31.7	37.6	46	8.4	100	80	
Hori.	1626.656	PK	49.4	25.5	13.2	40.8	47.3	73.9	26.6	103	166	
Hori.	4882	PK	49.3	31.4	6.4	41.5	45.6	73.9	28.3	100	0	
Hori.	7323	PK	47.8	36.2	8.1	41.2	50.9	73.9	23	100	0	
Hori.	9764	PK	46.7	38.7	8.9	40.4	53.9	73.9	20	100	0	
Hori.	12205	PK	46.7	39.6	10.2	39.2	57.3	73.9	16.6	100	0	
Hori.	1626.656	AV	40.4	25.5	13.2	40.8	38.3	53.9	15.6	103	166	
Hori.	4882	AV	35.8	31.4	6.4	41.5	32.1	53.9	21.8	100	0	
Hori.	7323	AV	35.3	36.2	8.1	41.2	38.4	53.9	15.5	100	0	
Hori.	9764	AV	34.7	38.7	8.9	40.4	41.9	53.9	12	100	0	
Hori.	12205	AV	33.3	39.6	10.2	39.2	43.9	53.9	10	100	0	
Vert.	41.547	QP	41.8	14.1	7.1	31.9	31.1	40	8.9	100	4	
Vert.	335.064	QP	36	14.9	7.2	31.7	26.4	46	19.6	100	44	
Vert.	1626.816	PK	49.7	25.5	13.2	40.8	47.6	73.9	26.3	105	323	
Vert.	4882	PK	49.5	31.4	6.4	41.5	45.8	73.9	28.1	100	0	
Vert.	7323	PK	47.4	36.2	8.1	41.2	50.5	73.9	23.4	100	0	
Vert.	9764	PK	46.8	38.7	8.9	40.4	54	73.9	19.9	100	0	
Vert.	12205	PK	45.5	39.6	10.2	39.2	56.1	73.9	17.8	100	0	
Vert.	1626.816	AV	41.7	25.5	13.2	40.8	39.6	53.9	14.3	105	323	
Vert.	4882	AV	35.9	31.4	6.4	41.5	32.2	53.9	21.7	100	0	
Vert.	7323	AV	35.7	36.2	8.1	41.2	38.8	53.9	15.1	100	0	
Vert.	9764	AV	34.6	38.7	8.9	40.4	41.8	53.9	12.1	100	0	
Vert.	12205	AV	33.1	39.6	10.2	39.2	43.7	53.9	10.2	100	0	

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

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

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

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Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	
Test room	No.1 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	June 29, 2012	July 3, 2012
Temperature / Humidity	23 deg.C , 55 %RH	22 deg.C , 54 %RH
Engineer	Hikaru Shirasawa	Hikaru Shirasawa
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.	41.452	QP	34.4	14.1	7.1	31.9	23.7	40	16.3	150	95	PK:VBW 3MHz
Hori.	168.796	QP	37.7	15.5	9	31.8	30.4	43.5	13.1	200	193	AV:VBW 10Hz
Hori.	185.535	QP	44.2	16.1	9.1	31.8	37.6	43.5	5.9	150	220	
Hori.	213.234	QP	45.4	16.6	9.6	31.8	39.8	43.5	**3.7**	150	47	
Hori.	372.363	QP	35.2	15.8	7.4	31.7	26.7	46	19.3	100	217	
Hori.	1652.591	PK	50.7	25.5	13.2	40.8	48.6	73.9	25.3	100	225	
Hori.	2483.5	PK	49.2	28.7	14	40.7	51.2	73.9	22.7	100	191	
Hori.	4960	PK	48.6	31.6	6.5	41.4	45.3	73.9	28.6	100	0	
Hori.	7440	PK	47.7	36.3	8.2	41.3	50.9	73.9	23	100	0	
Hori.	9920	PK	47.4	38.9	9	40.3	55	73.9	18.9	100	0	
Hori.	12400	PK	46.2	39.7	10.3	39	57.2	73.9	16.7	100	0	
Hori.	1652.591	AV	41.7	25.5	13.2	40.8	39.6	53.9	14.3	100	225	
Hori.	2483.5	AV	33.6	28.7	14	40.7	35.6	53.9	18.3	100	191	
Hori.	4960	AV	36.7	31.6	6.5	41.4	33.4	53.9	20.5	100	0	
Hori.	7440	AV	35.5	36.3	8.2	41.3	38.7	53.9	15.2	100	0	
Hori.	9920	AV	34.3	38.9	9	40.3	41.9	53.9	12	100	0	
Hori.	12400	AV	32.8	39.7	10.3	39	43.8	53.9	10.1	100	0	
Vert.	33.853	QP	40.3	16.8	6.9	31.9	32.1	40	7.9	100	106	
Vert.	576.001	QP	33	18.8	8.5	31.7	28.6	46	17.4	100	204	
Vert.	1652.576	PK	50.4	25.5	13.2	40.8	48.3	73.9	25.6	100	315	
Vert.	2483.5	PK	47.8	28.7	14	40.7	49.8	73.9	24.1	101	320	
Vert.	4960	PK	48.7	31.6	6.5	41.4	45.4	73.9	28.5	100	0	
Vert.	7440	PK	47.6	36.3	8.2	41.3	50.8	73.9	23.1	100	0	
Vert.	9920	PK	47.5	38.9	9	40.3	55.1	73.9	18.8	100	0	
Vert.	12400	PK	45.9	39.7	10.3	39	56.9	73.9	17	100	0	
Vert.	1652.576	AV	42.1	25.5	13.2	40.8	40	53.9	13.9	100	315	
Vert.	2483.5	AV	32.2	28.7	14	40.7	34.2	53.9	19.7	101	320	
Vert.	4960	AV	36.6	31.6	6.5	41.4	33.3	53.9	20.6	100	0	
Vert.	7440	AV	35.7	36.3	8.2	41.3	38.9	53.9	15	100	0	
Vert.	9920	AV	34.6	38.9	9	40.3	42.2	53.9	11.7	100	0	
Vert.	12400	AV	32.9	39.7	10.3	39	43.9	53.9	10	100	0	

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

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

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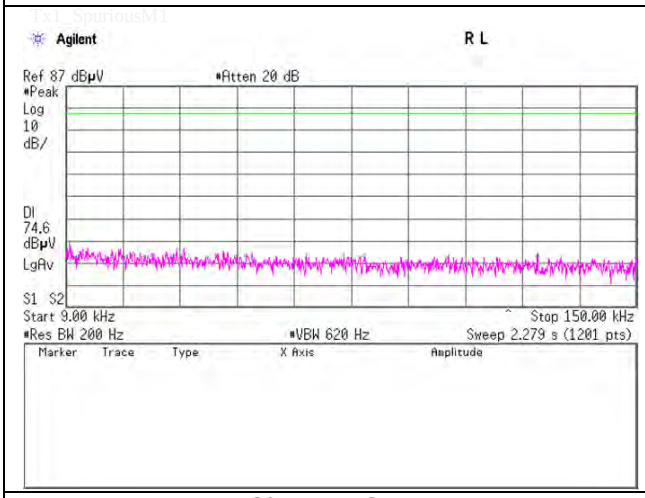
Spurious emission (Conducted)

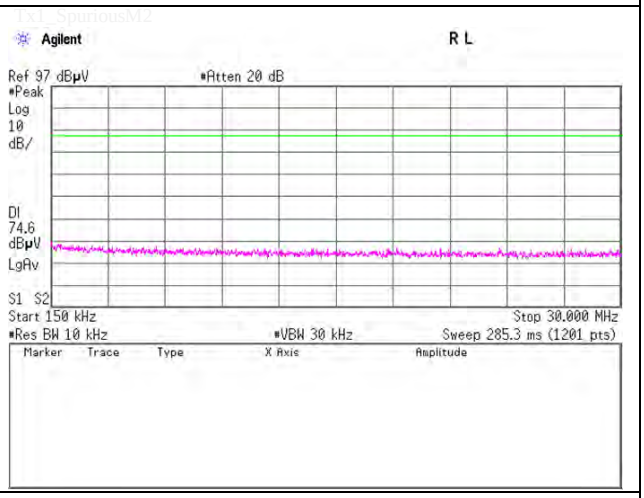
Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (below 1GHz)

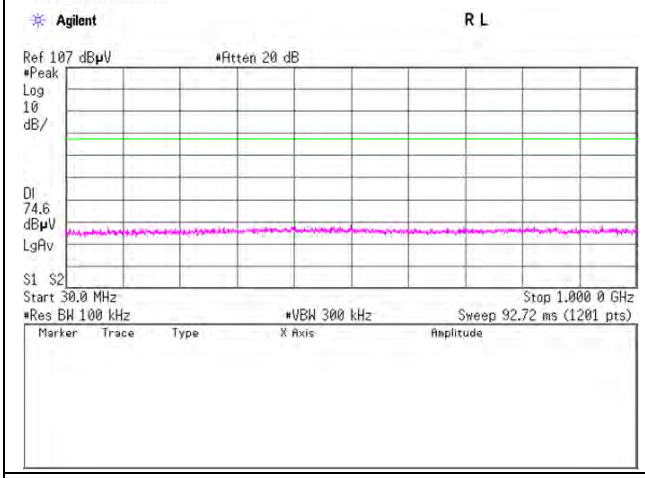
9kHz - 150kHz



150kHz - 30MHz



30MHz - 1GHz



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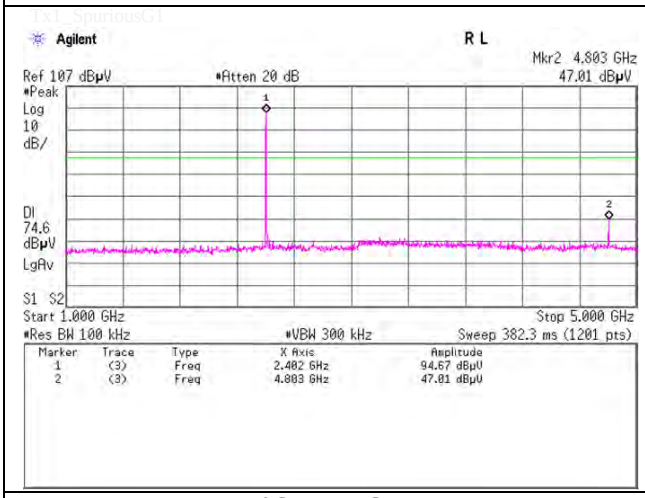
Spurious emission (Conducted)

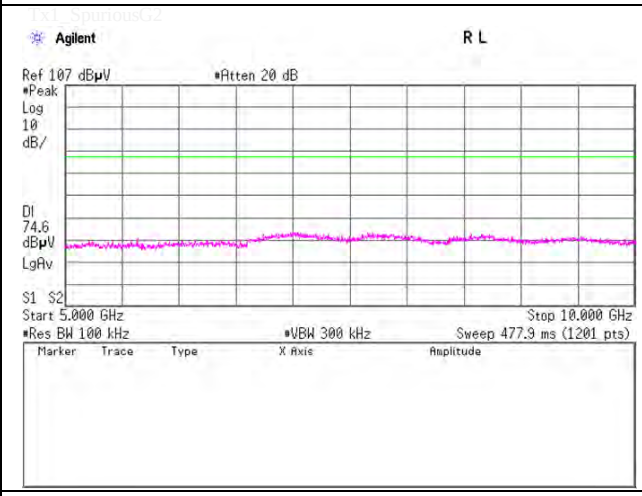
Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (above 1GHz)

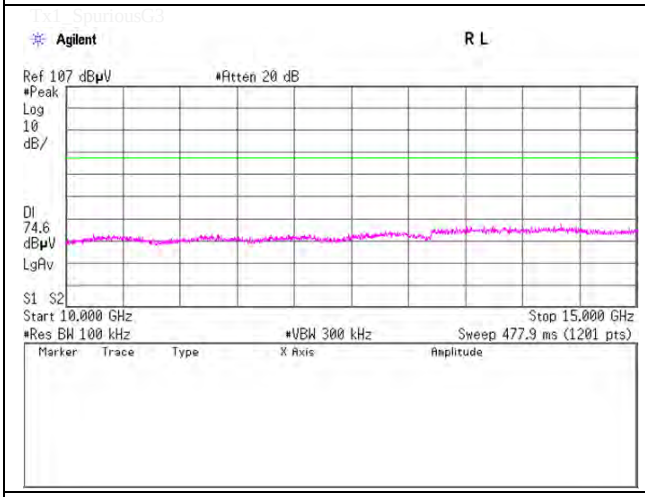
1GHz - 5GHz



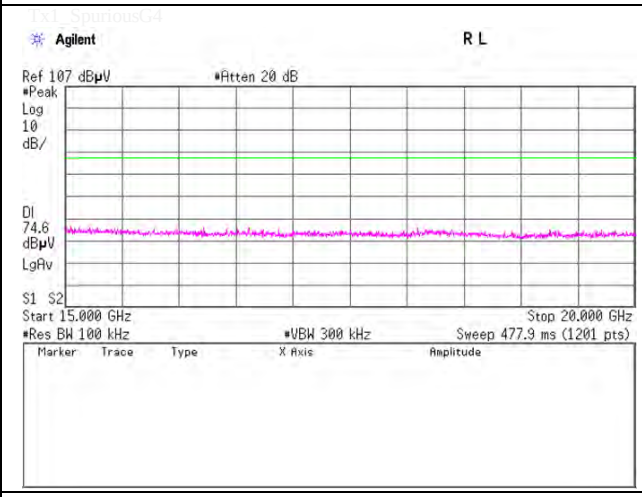
5GHz - 10GHz



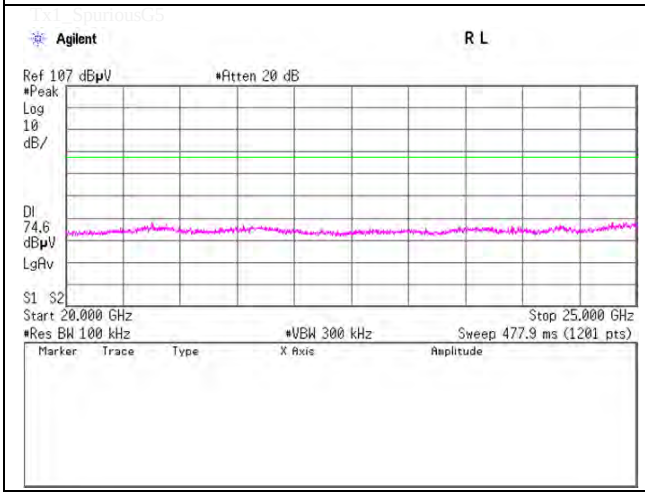
10GHz - 15GHz



15GHz - 20GHz



20GHz - 25GHz



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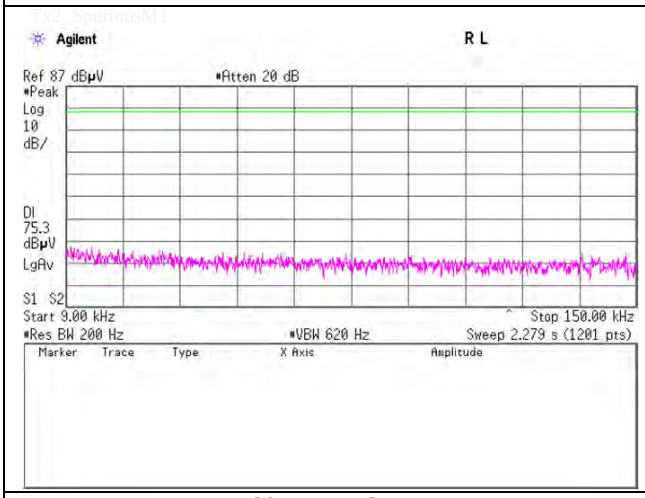
Spurious emission (Conducted)

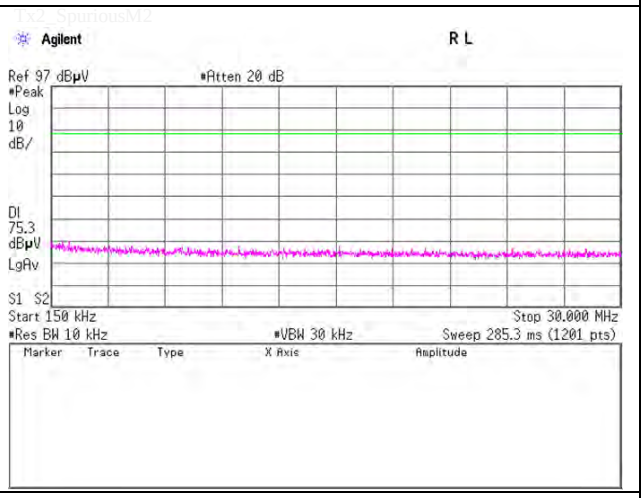
Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (below 1GHz)

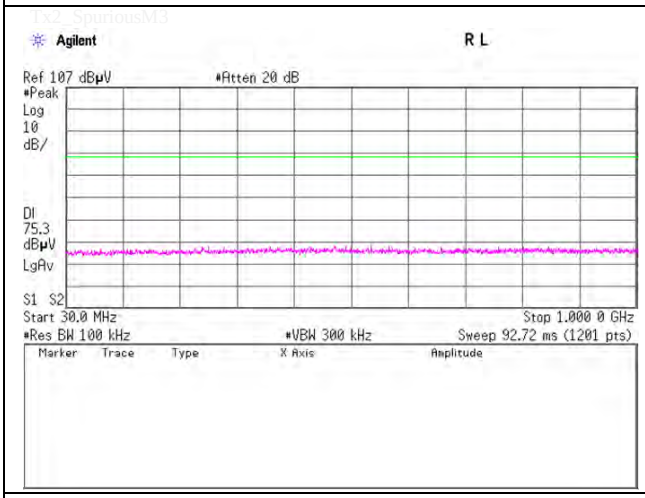
9kHz - 150kHz



150kHz - 30MHz



30MHz - 1GHz



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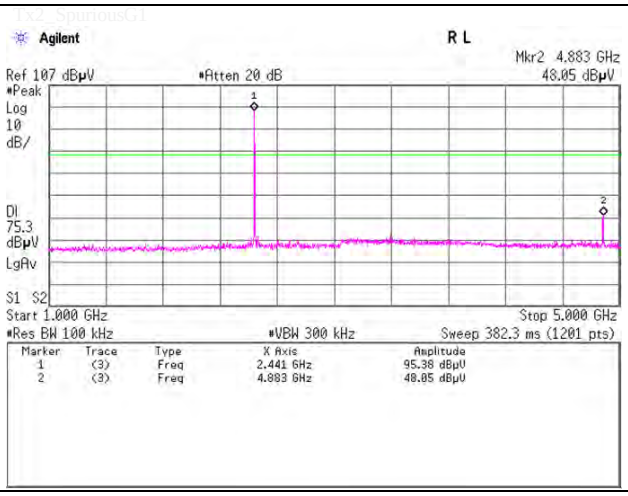
Spurious emission (Conducted)

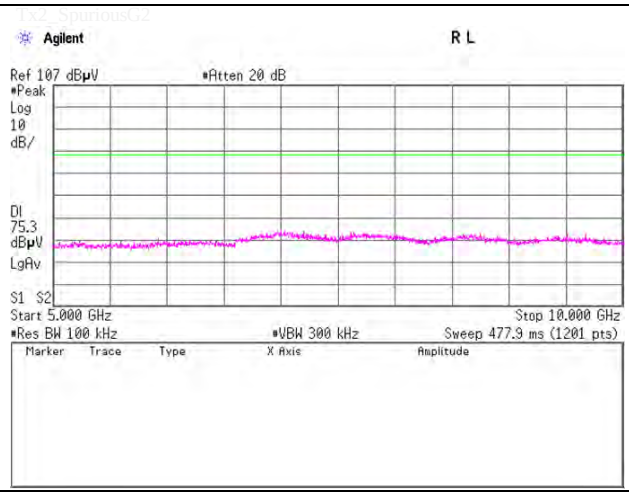
Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (above 1GHz)

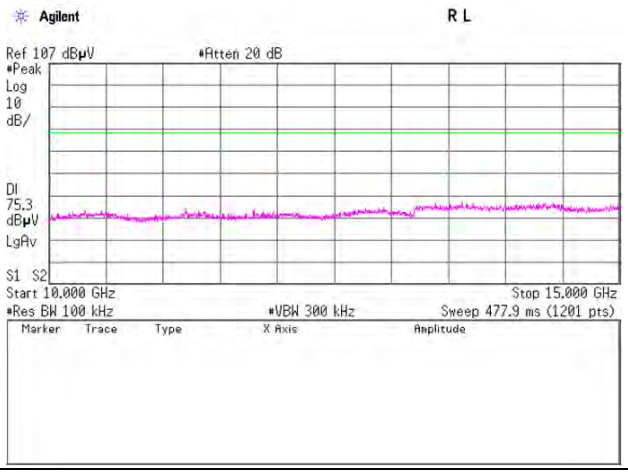
1GHz - 5GHz



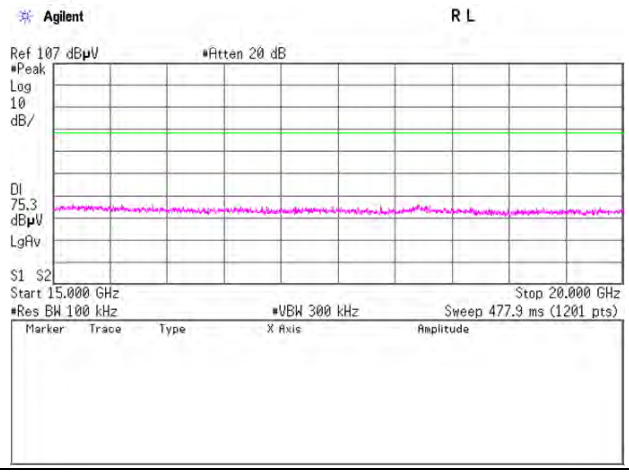
5GHz - 10GHz



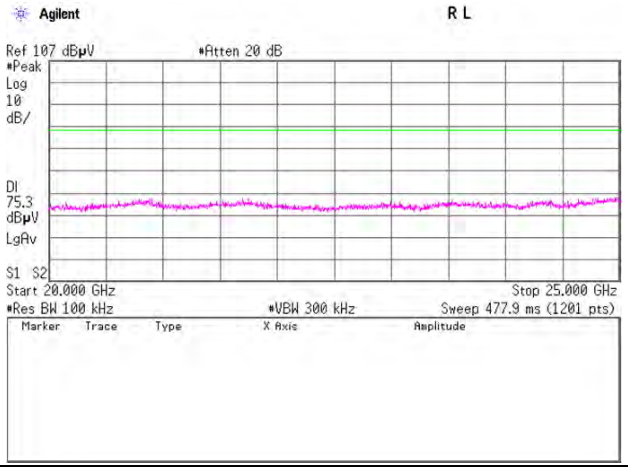
10GHz - 15GHz



15GHz - 20GHz



20GHz - 25GHz



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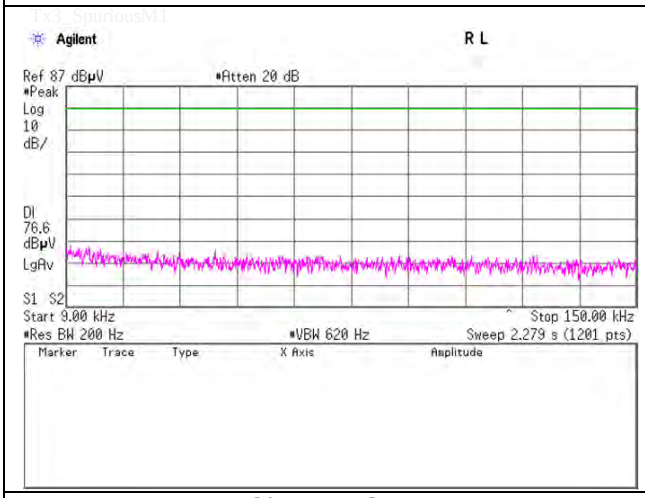
Spurious emission (Conducted)

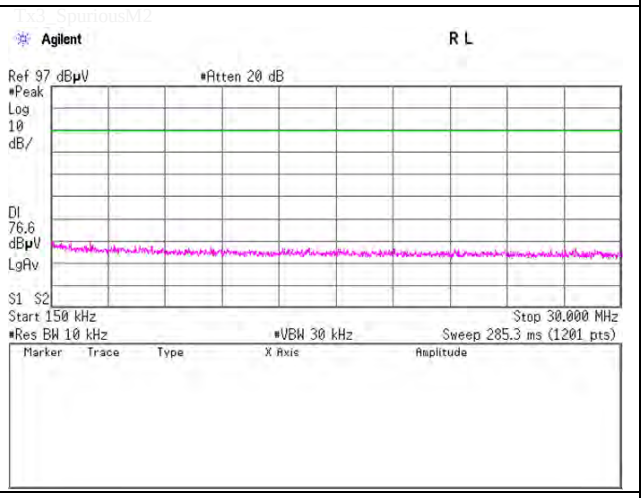
Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (below 1GHz)

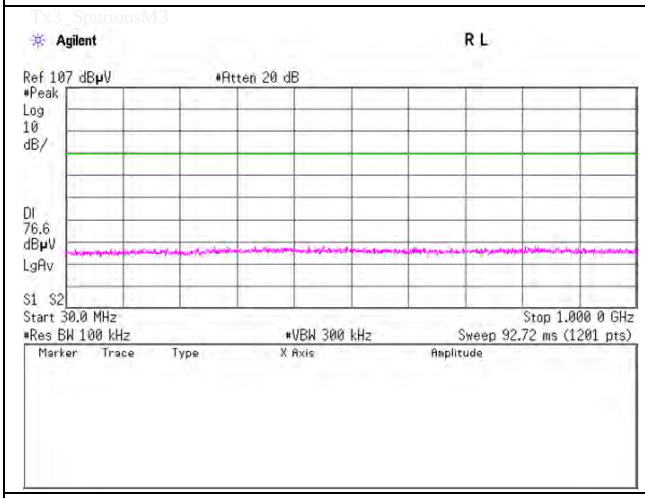
9kHz - 150kHz



150kHz - 30MHz



30MHz - 1GHz



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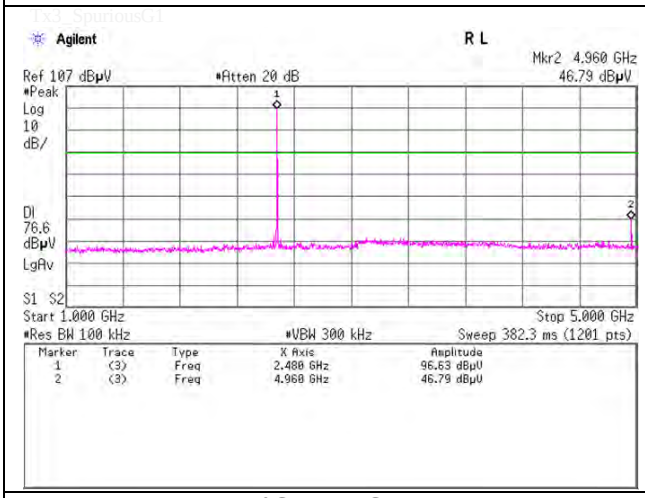
Spurious emission (Conducted)

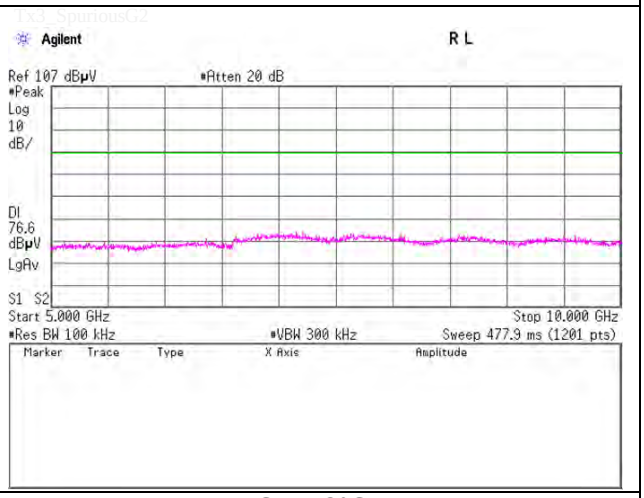
Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (above 1GHz)

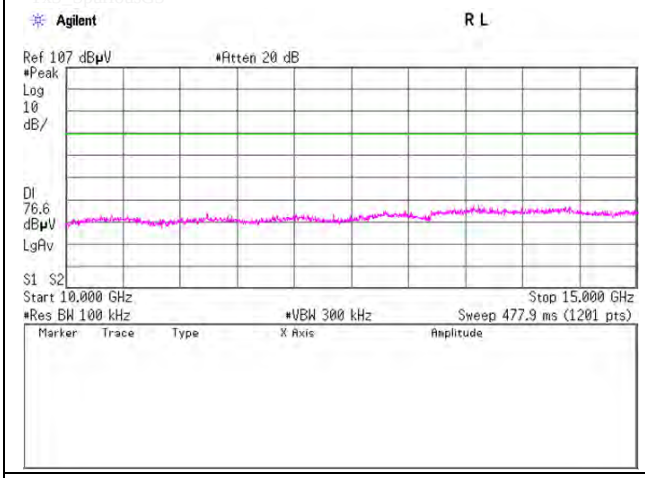
1GHz - 5GHz



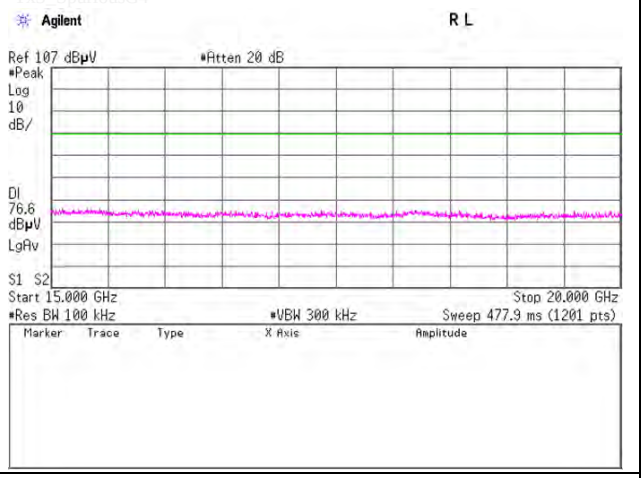
5GHz - 10GHz



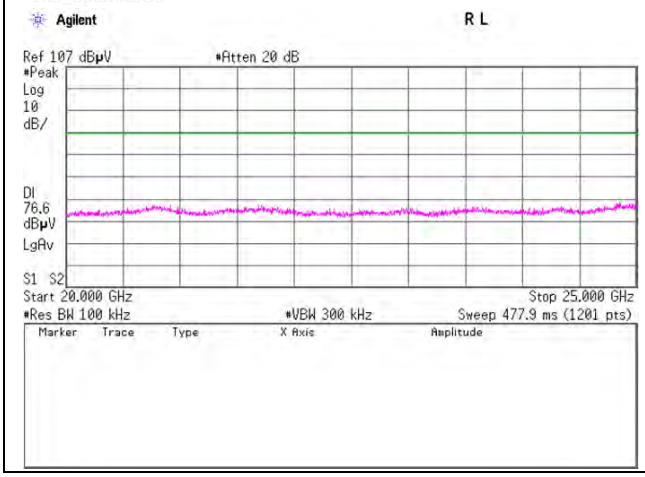
10GHz - 15GHz



15GHz - 20GHz



20GHz - 25GHz



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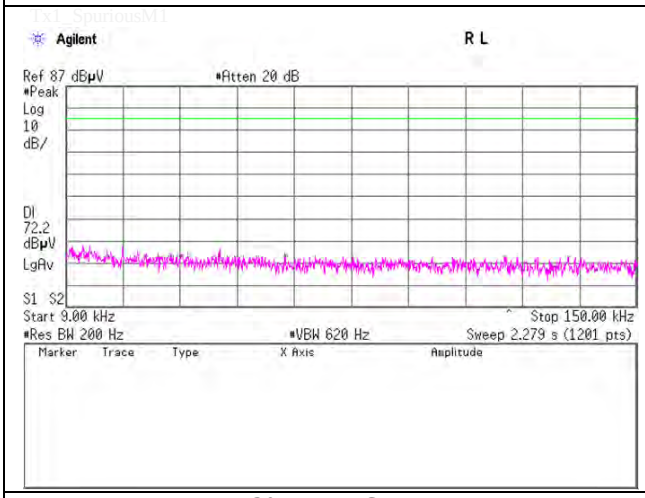
Spurious emission (Conducted)

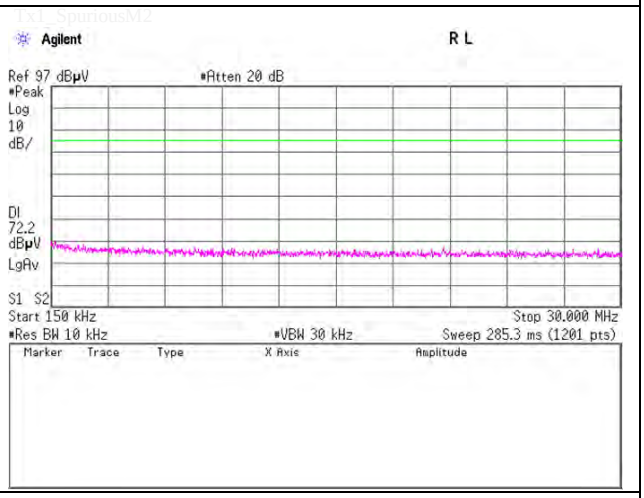
Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (below 1GHz)

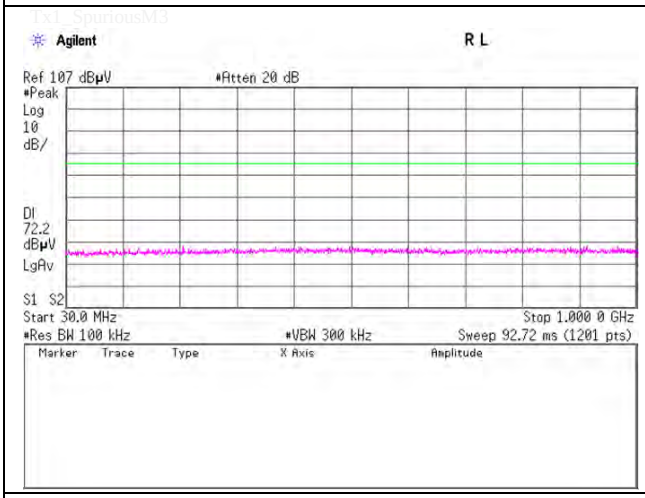
9kHz - 150kHz



150kHz - 30MHz



30MHz - 1GHz



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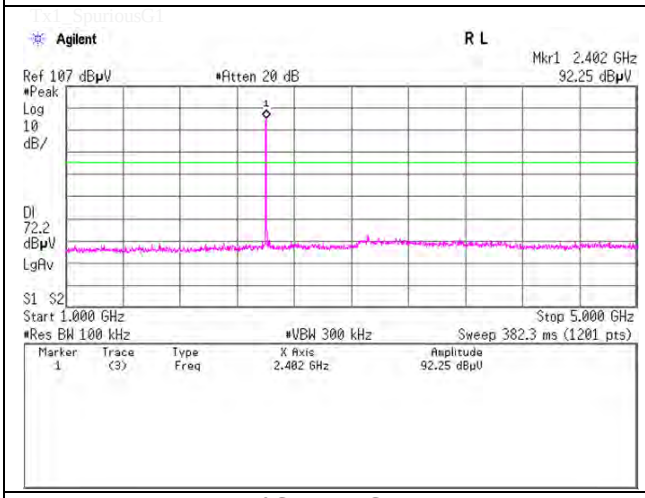
Spurious emission (Conducted)

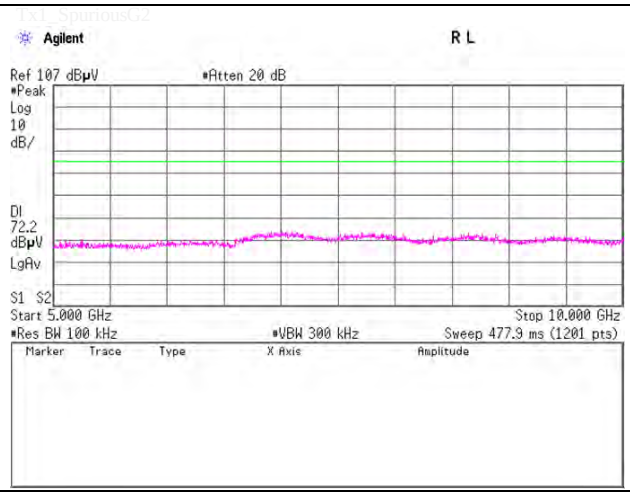
Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (above 1GHz)

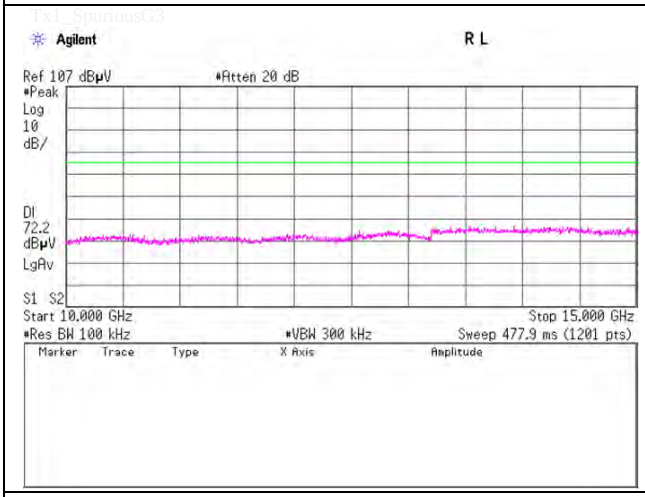
1GHz - 5GHz



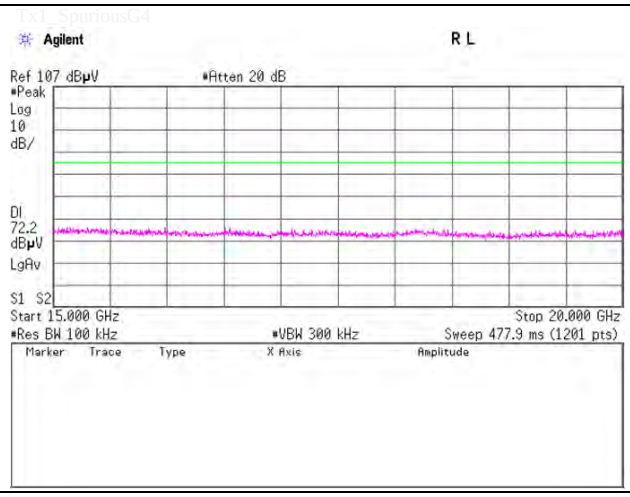
5GHz - 10GHz



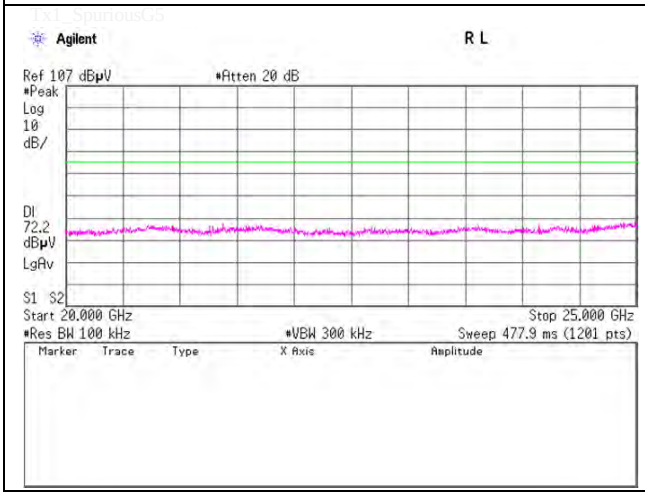
10GHz - 15GHz



15GHz - 20GHz



20GHz - 25GHz



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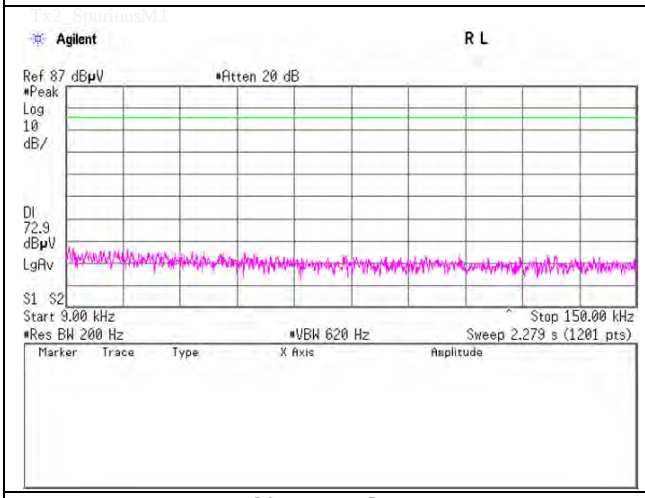
Spurious emission (Conducted)

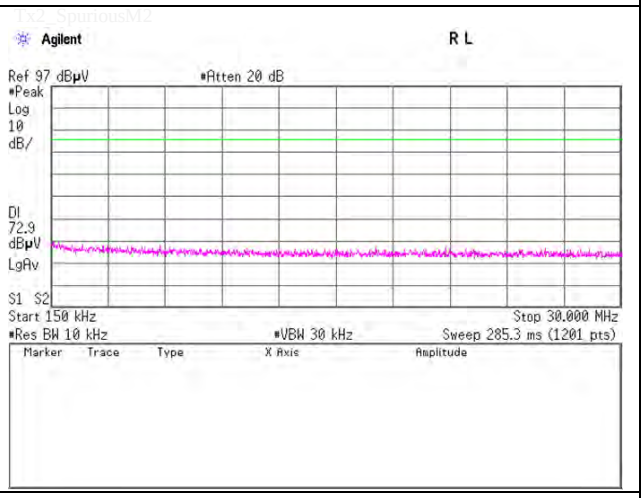
Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (below 1GHz)

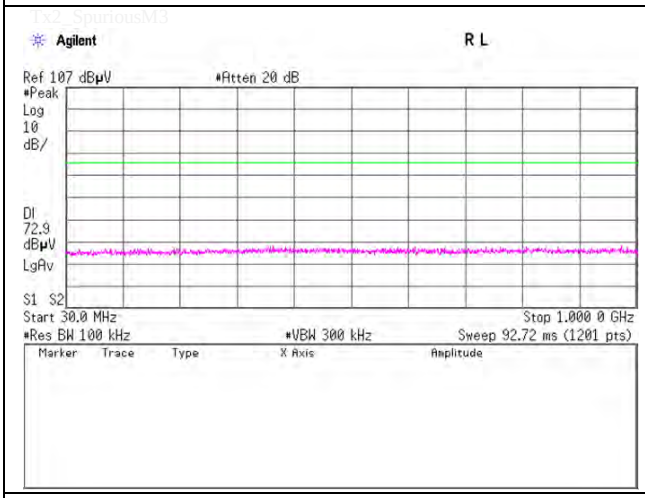
9kHz - 150kHz



150kHz - 30MHz



30MHz - 1GHz



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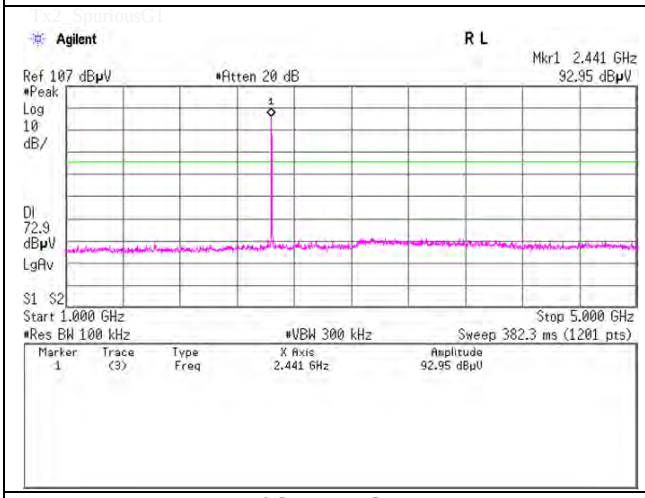
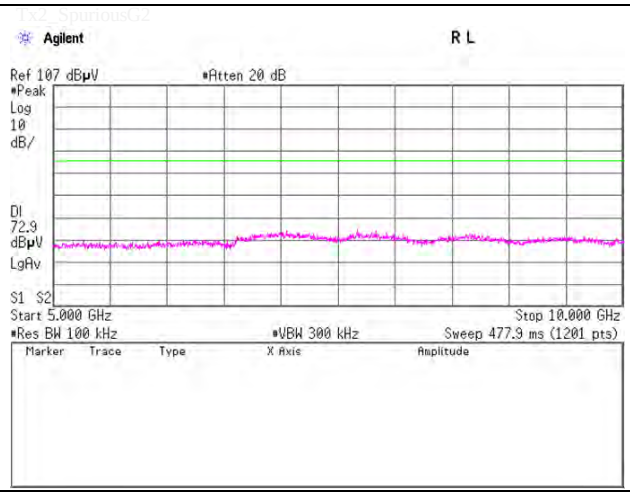
Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (above 1GHz)

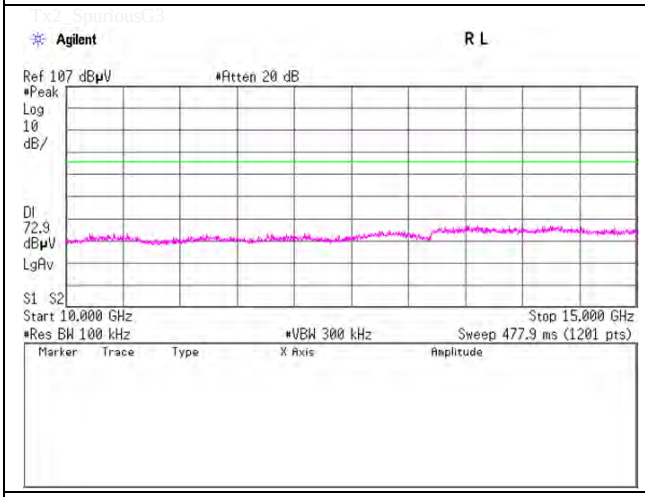
1GHz - 5GHz



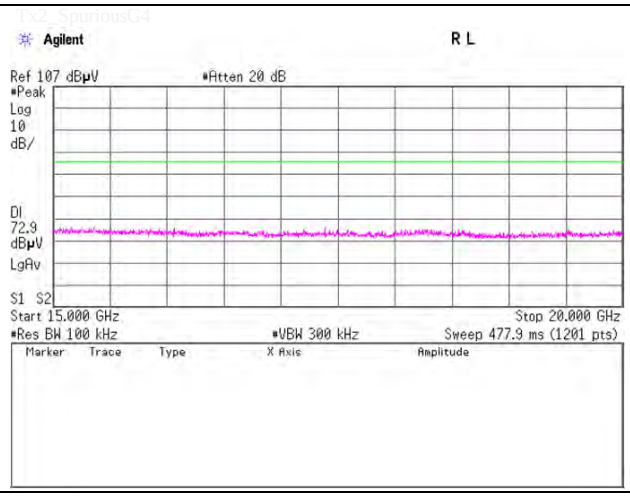
5GHz - 10GHz



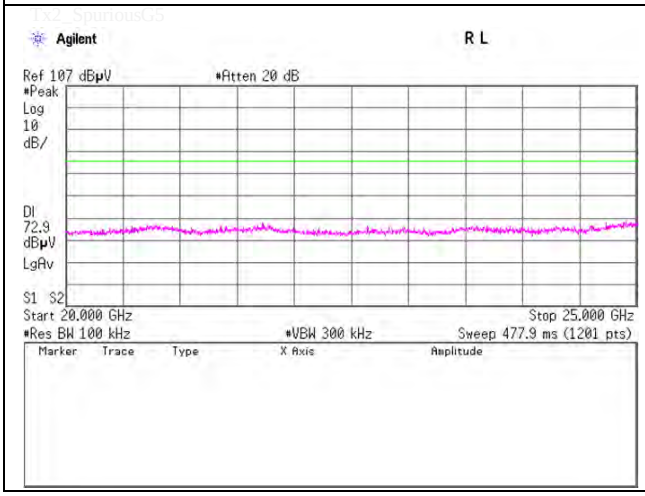
10GHz - 15GHz



15GHz - 20GHz



20GHz - 25GHz



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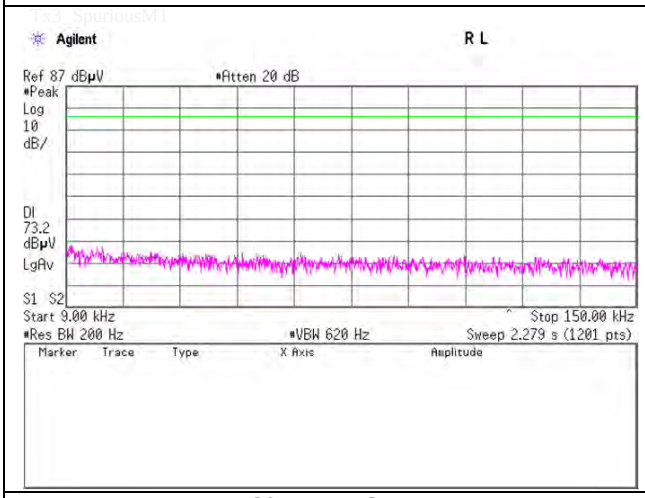
Spurious emission (Conducted)

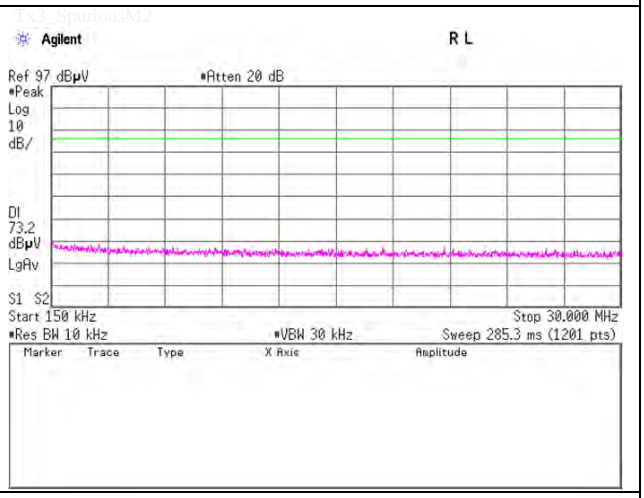
Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 1GHz)

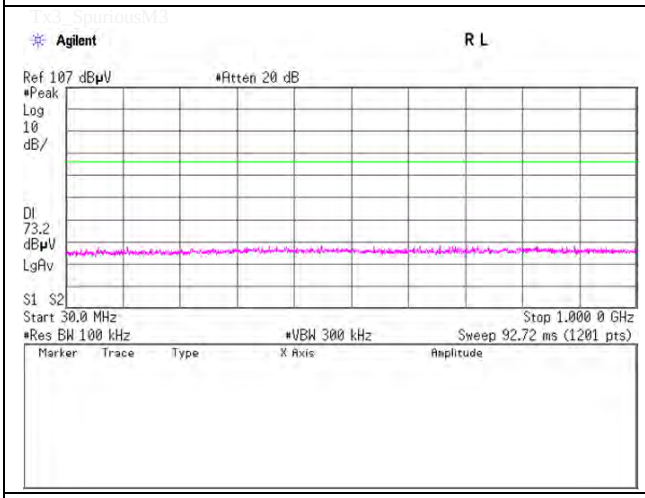
9kHz - 150kHz



150kHz - 30MHz



30MHz - 1GHz



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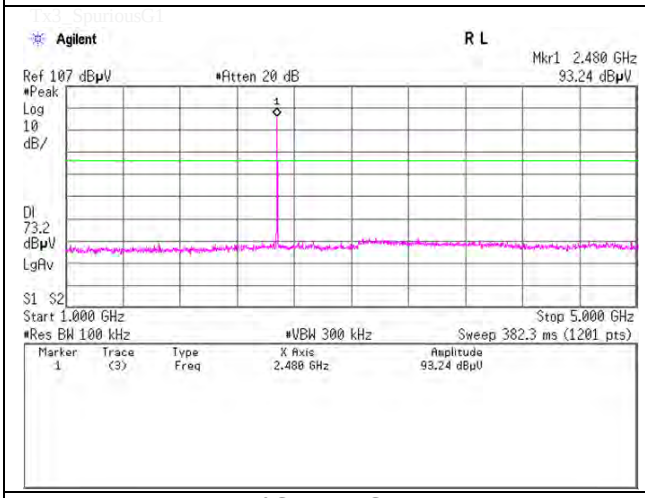
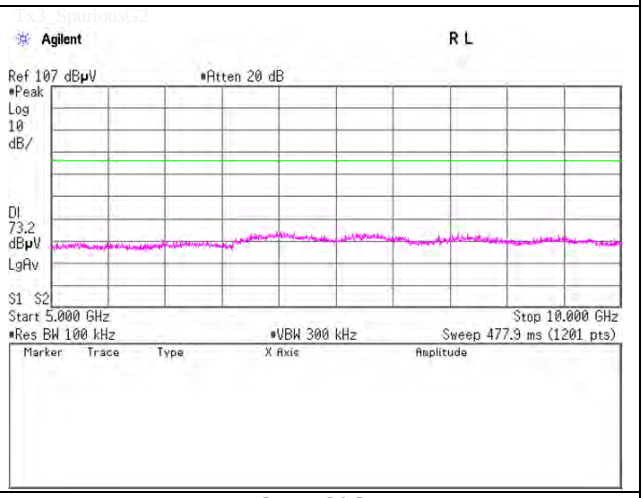
Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (above 1GHz)

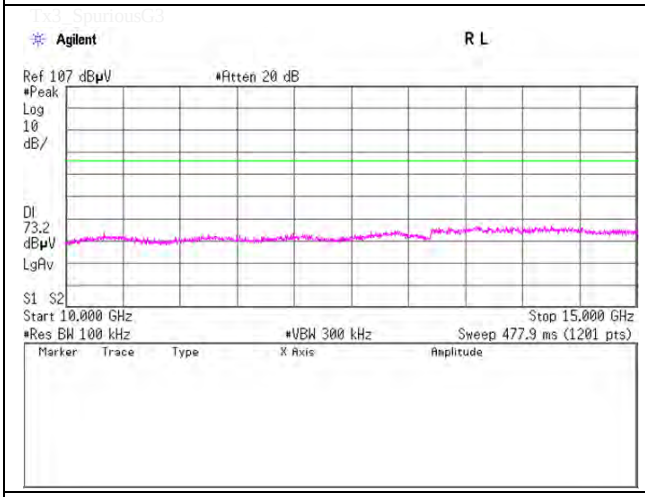
1GHz - 5GHz



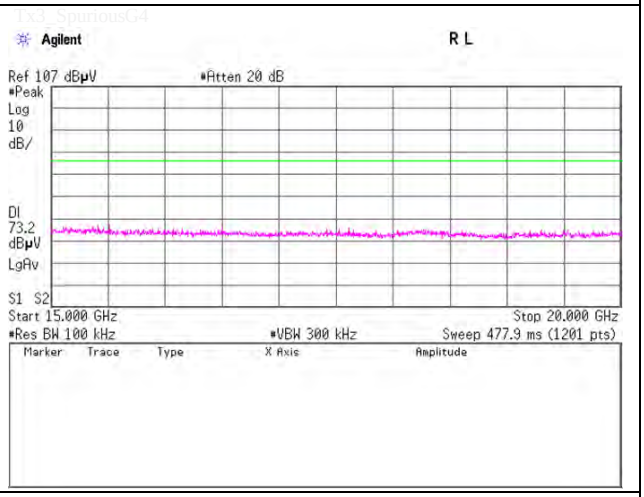
5GHz - 10GHz



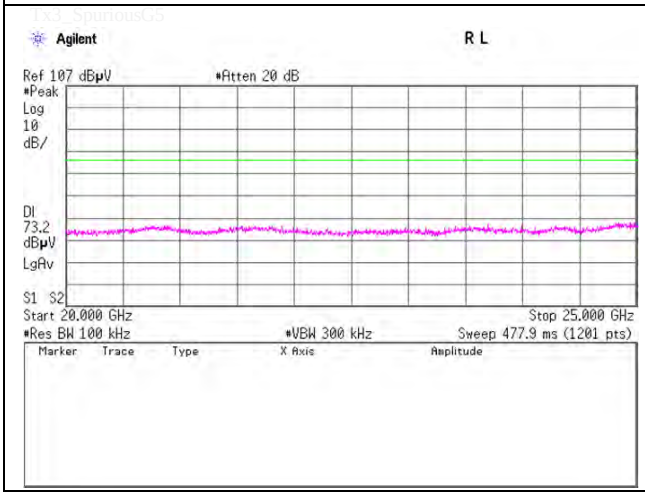
10GHz - 15GHz



15GHz - 20GHz



20GHz - 25GHz



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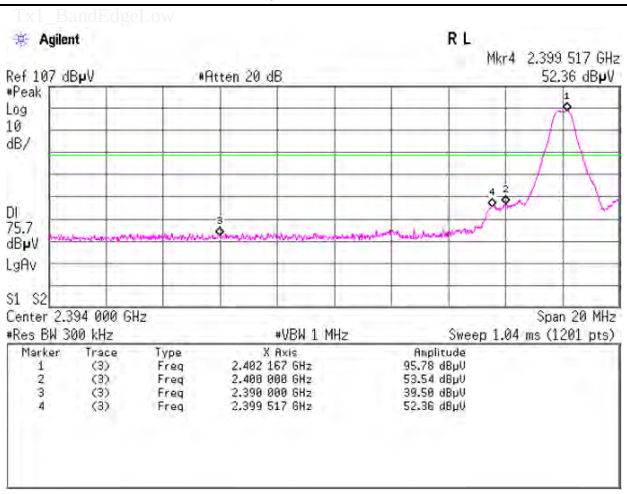
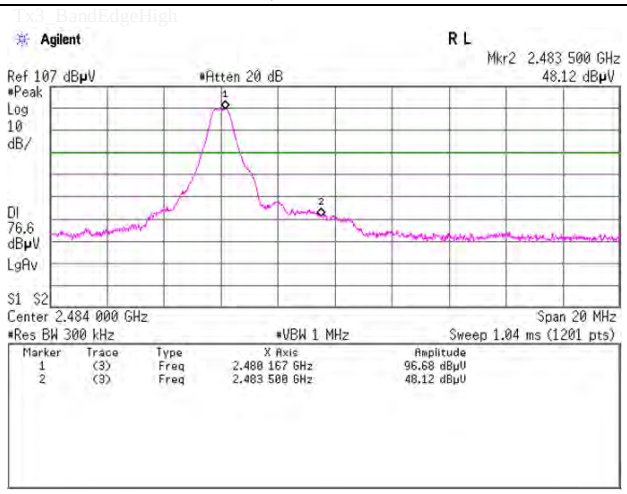
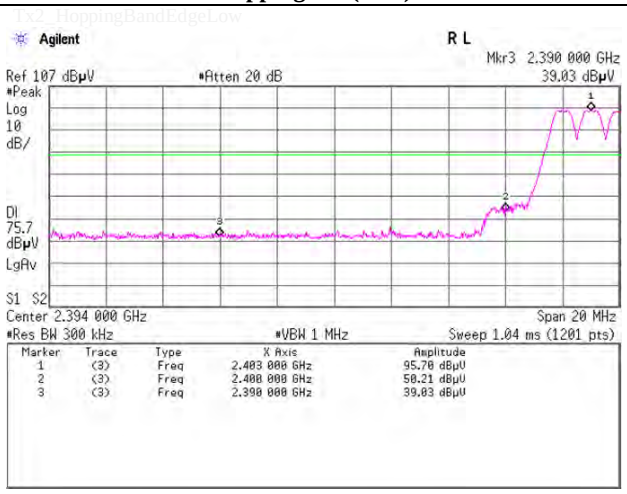
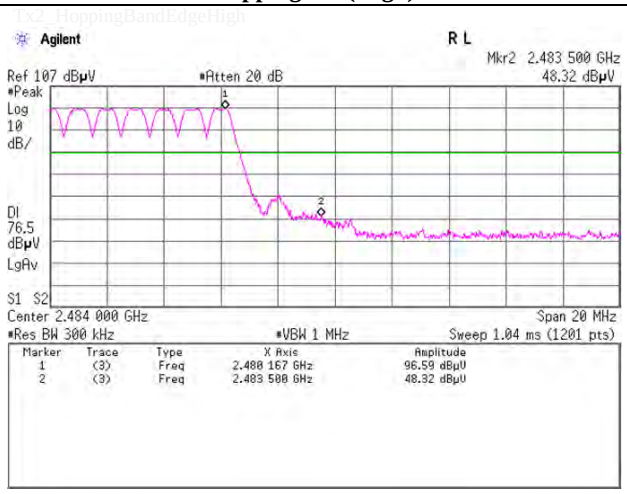
Spurious emission (Conducted)

Band Edge compliance

Tx, Bluetooth, BDR, PRBS9	
Tx, 2402MHz	**Tx, 2480MHz**
	

Tx, Bluetooth, BDR, PRBS9	
Hopping On (Low)	**Hopping On (High)**
	

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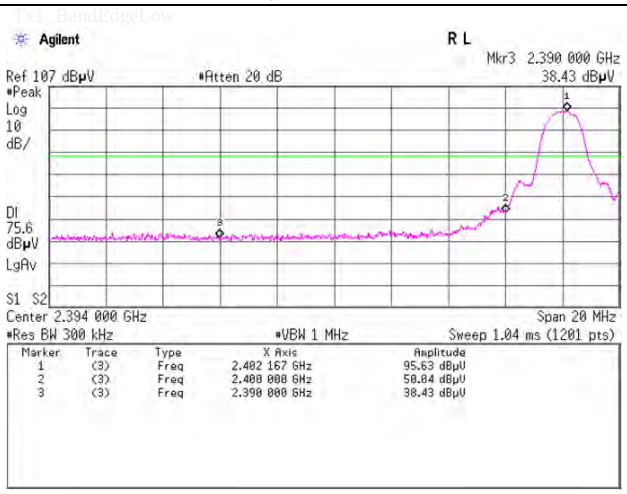
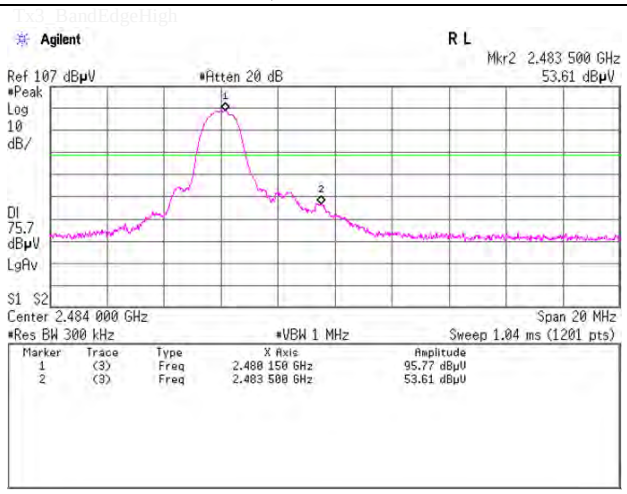
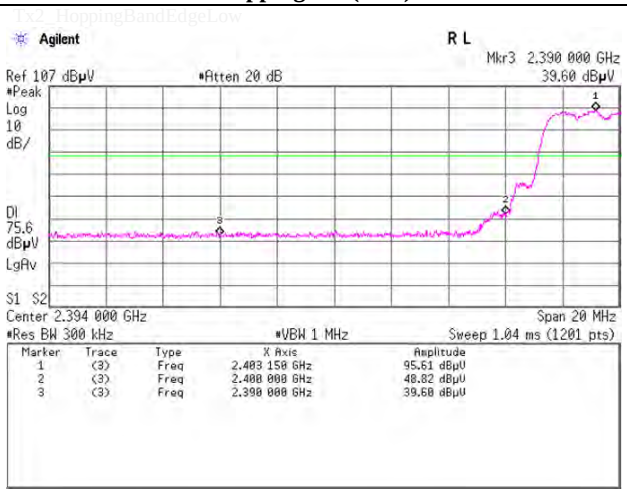
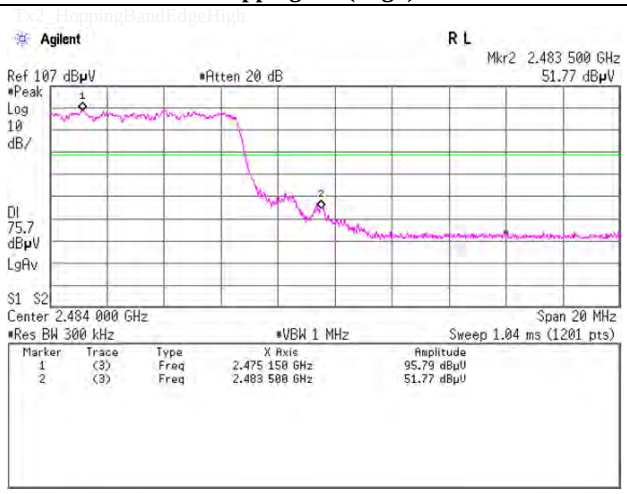
Spurious emission (Conducted)

Band Edge compliance

Tx, Bluetooth, EDR, PRBS9	
Tx, 2402MHz	**Tx, 2480MHz**
	

Tx, Bluetooth, EDR, PRBS9	
Hopping On (Low)	**Hopping On (High)**
	

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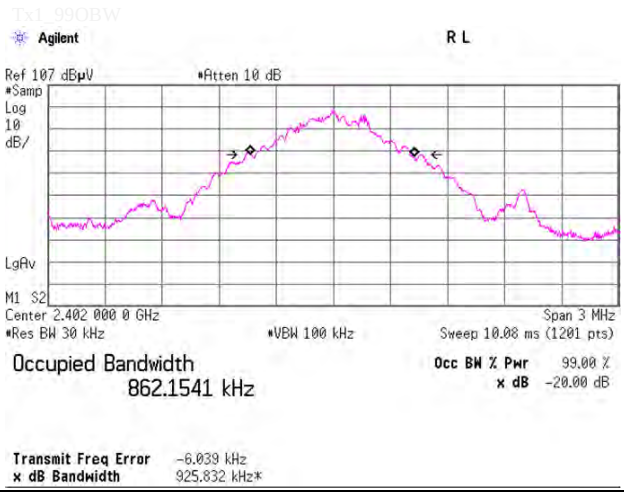
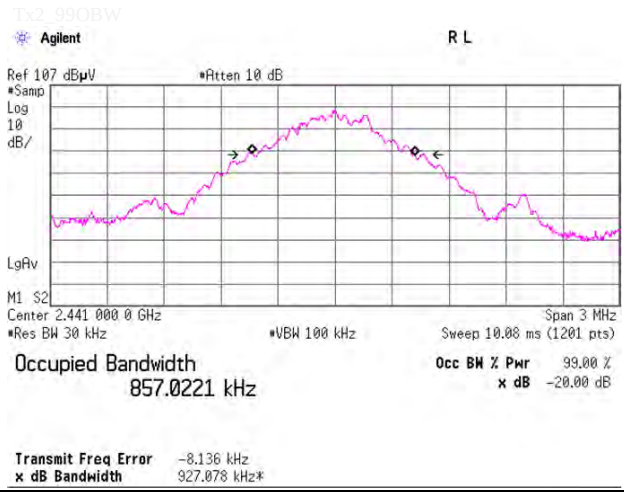
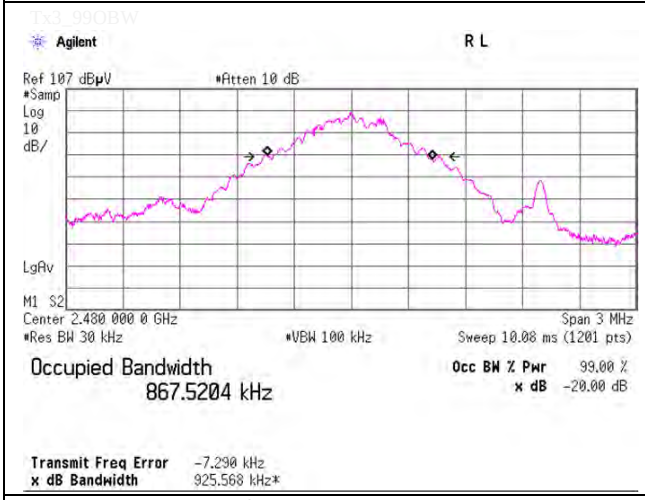
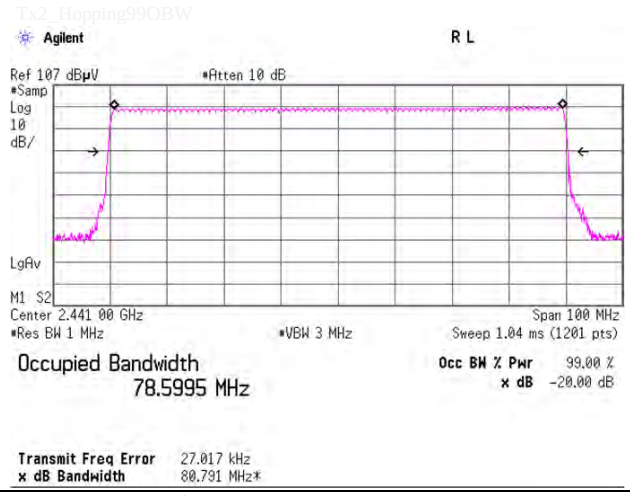
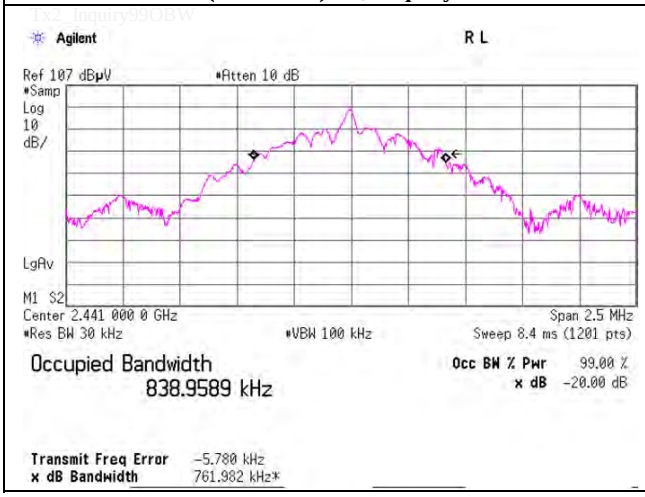
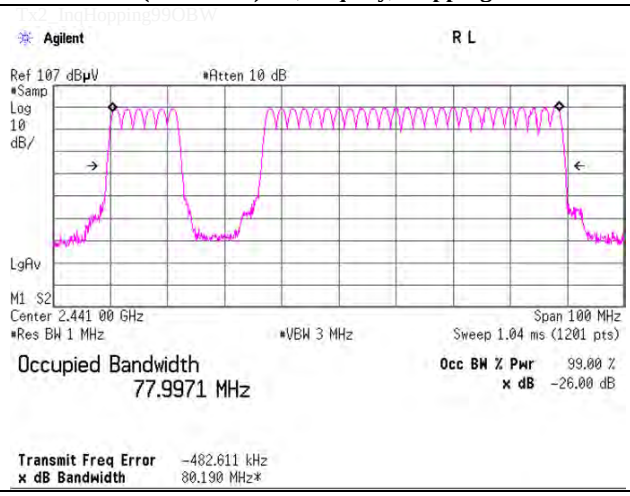
99% Occupied Bandwidth

Tx, Bluetooth, BDR, PRBS9	
Tx, 2402MHz	**Tx, 2441MHz**
	
Tx, 2480MHz	**Tx, Hopping On**
	
(Reference) Tx, Inquiry	**(Reference) Tx, Inquiry, Hopping**
	

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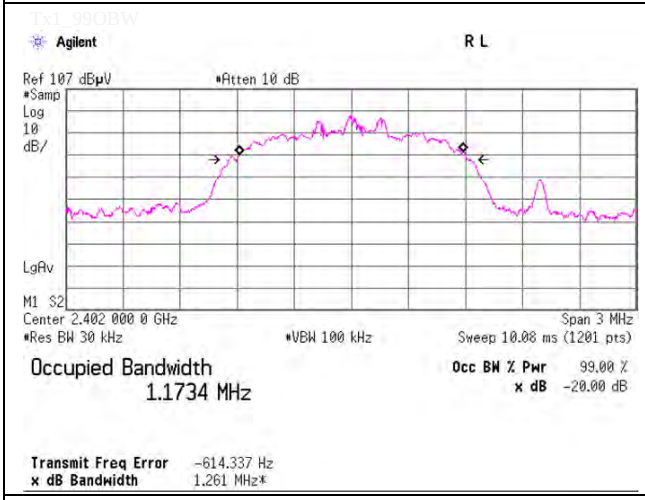
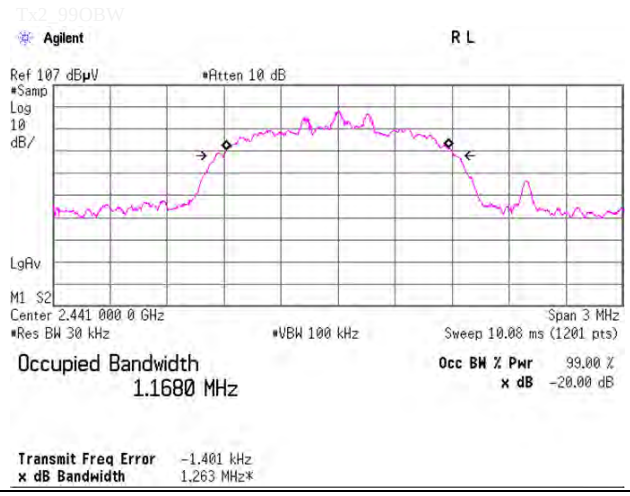
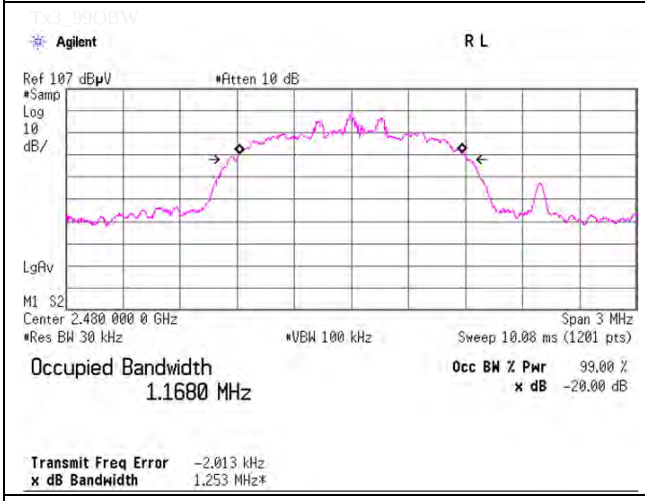
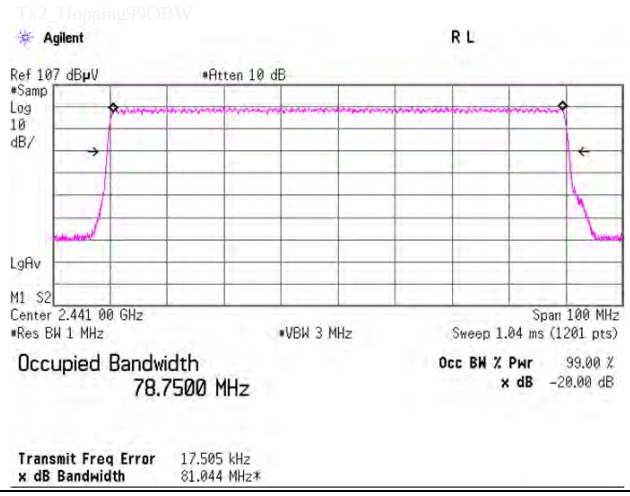
99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
Tx, 2402MHz	**Tx, 2441MHz**
	
Tx, 2480MHz	**Tx, Hopping On**
	
Tx2_InquiryOBW	Tx2_InqHoppingOBW

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	E4448A	MY48250106	AT	2012/03/16 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2011/11/09 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2012/03/12 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2012/04/19 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2012/04/19 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2012/03/12 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2012/04/10 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2012/05/22 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2011/08/11 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2012/02/06 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2011/10/22 * 12
SJM-12	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE	-
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2012/03/12 * 12
SCC-G02	Coaxial Cable	Suhner	SUCOFLEX 104A	46498/4A	RE	2012/04/10 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2012/05/22 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2011/08/28 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2012/02/06 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2012/03/30 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2012/03/12 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2012/03/12 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2012/02/10 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2012/02/10 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2011/08/30 * 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	2012/04/10 * 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	2012/04/10 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2011/11/16 * 12
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2011/09/25 * 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 :
CE: Conducted emission ,
RE: Radiated emission ,
AT: Antenna terminal disturbance voltage