



RADIO TEST REPORT

Test Report No. : 32KE0041-HO-02-B-R1

Applicant : Sony Corporation
Type of Equipment : Personal Computer
Model No. : SVD112A1WL
FCC ID : AK8SVD112A1WL
Test regulation : FCC Part 15 Subpart C: 2012
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 32KE0041-HO-02-B. 32KE0041-HO-02-B is replaced with this report.

Date of test: July 18 to August 7, 2012

Representative test engineer:

Yutaka Yoshida
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

13-EM-F0429

CONTENTS	PAGE
SECTION 1: Customer information.....	3
SECTION 2: Equipment under test (E.U.T.).....	3
SECTION 3: Test specification, procedures & results.....	5
SECTION 4: Operation of E.U.T. during testing.....	9
SECTION 5: Conducted Emission.....	11
SECTION 6: Radiated Spurious Emission	12
SECTION 7: Antenna Terminal Conducted Tests.....	13
APPENDIX 1: Data of EMI test.....	14
Conducted Emission	14
20dB Bandwidth and Carrier Frequency Separation.....	18
Number of Hopping Frequency	21
Dwell time.....	23
Maximum Peak Output Power	26
Radiated Spurious Emission	27
Conducted Spurious Emission	37
Conducted Emission Band Edge compliance	49
99%Occupied Bandwidth	51
APPENDIX 2: Test instruments	53
APPENDIX 3: Photographs of test setup.....	55
Conducted Emission	55
Radiated Spurious Emission	56
Worst Case Position	57

SECTION 1: Customer information

Company Name : Sony Corporation
Address : 1-7-1 Konan, Minato-ku, Tokyo, 399-8282 Japan
Telephone Number : +81-263-71-8272
Facsimile Number : +81-263-71-8984
Contact Person : Yuichi Kosaka

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

2.1 Identification of E.U.T.

Type of Equipment : Personal Computer
Model No. : SVD112A1WL
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 10.5V, 4.3A
Receipt Date of Sample : July 7, 2012
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product description

General Specification

Feature of EUT : This model is co-located with Wireless LAN(IEEE802.11a/b/g/n)/
Bluetooth module, NFC Module and stylus.
Each antenna is included in the Personal computer.
This model can co-operate Wireless LAN(IEEE802.11a) + Bluetooth +
NFC + stylus.
Clock frequency(ies) in the system : 12MHz, 25MHz

Radio Specification

Specification of Wireless LAN (IEEE802.11a/b/g) and Bluetooth

Type of radio	Wireless LAN (IEEE802.11a)	Wireless LAN (IEEE802.11b/g)	Bluetooth (EDR/BDR/LE)
Equipment Type	Transceiver		
Frequency of Operation	Low Band Lower frequency=5180MHz Upper frequency=5320MHz High Band Lower frequency=5500MHz Upper frequency=5700MHz Upper Band Lower frequency=5745MHz Upper frequency=5825MHz	Lower frequency=2412MHz Upper frequency=2462MHz	Lower frequency=2402MHz Upper frequency=2480MHz
Bandwidth & Channel spacing	Bandwidth: 20MHz Ch spacing: 20MHz	Bandwidth: 20MHz Ch spacing: 5MHz	Bandwidth: 1MHz Ch spacing: 1MHz (EDR/BDR), 2MHz (LE)
Type of Modulation	OFDM	11b: DSSS 11g: OFDM	EDR/BDR: GFSK, $\pi/4$ DQPSK, 8DPSK LE: GFSK
Antenna Type	PIFA (Internal)		
Antenna Connector Type	U.FL compatible connector		
Antenna Gain	Antenna 1: +1.95dBi (2.4GHz) +1.83dBi (5GHz) Antenna 2: +1.20dBi (2.4GHz) +2.33dBi (5GHz) (Including Cableloss)	+1.20dBi	
Power Supply	DC 3.3V		
Operating temperature range	+5 to +35 deg. C.		

Specification of Wireless LAN (IEEE802.11n)

Type of radio	Wireless LAN (IEEE802.11n)			
	2.4G Band MISO / MIMO (20M Band)	2.4G Band MISO / MIMO (40M Band)	5G Band MISO / MIMO (20M Band)	5G Band MISO / MIMO (40M Band)
Equipment Type	Transceiver			
Frequency of Operation	Lower frequency =2412MHz Upper frequency =2462MHz	Lower frequency =2422MHz Upper frequency =2452MHz	Low Band Lower frequency=5180MHz Upper frequency=5320MHz High Band Lower frequency=5500MHz Upper frequency=5700MHz Upper Band Lower frequency=5745MHz Upper frequency=5825MHz	Low Band Lower frequency=5190MHz Upper frequency=5310MHz High Band Lower frequency=5510MHz Upper frequency=5670MHz Upper Band Lower frequency=5755MHz Upper frequency=5795MHz
Bandwidth & Channel spacing	Bandwidth: 20MHz Ch spacing: 5MHz	Bandwidth: 40MHz Ch spacing: 5MHz	Bandwidth: 20MHz Ch spacing: 20MHz	Bandwidth: 40MHz Ch spacing: 40MHz
Type of Modulation	OFDM			
Antenna Type	PIFA (Internal)			
Antenna Connector Type	U.FL compatible connector			
Antenna Gain	Antenna 1: +1.95dBi (2.4GHz) +1.83dBi (5GHz) Antenna 2: +1.20dBi (2.4GHz) +2.33dBi (5GHz) (Including Cableloss)			
Power Supply	DC 3.3V			
Operating temperature range	+5 to +35 deg. C.			

*This test report applies for Bluetooth (EDR/BDR).

*Wireless LAN (IEEE802.11a/n, 5G Band) and Bluetooth transmit simultaneously by Antenna 2. The co-location and co-operation are tested in this test report.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on July 23, 2012 and effective August 22, 2012

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

* The revision on July 23, 2012 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.4	FCC: Section 15.207 IC: RSS-Gen 7.2.4	QP 10.7dB, 0.50234MHz, L AV 7.7dB, 0.50408MHz/0.50234MHz, L	Complied	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-210 A8.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-210 A8.1 (a)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-210 A8.1 (d)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-210 A8.1 (d)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 4.8	FCC: Section15.247(b)(1) IC: RSS-210 A8.4 (2)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 4.9	FCC: Section15.247(d) IC: RSS-210 A8.5 RSS-Gen 6 and 7.2.3		4.3dB 140.003MHz/140.013MHz, QP, Vert.	Complied

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

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)

This EUT provides stable voltage(DC3.3V) constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	-	Conducted

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

3.4 Uncertainty

EMI

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

Test room (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.5dB
No.2	3.6dB
No.3	3.6dB
No.4	3.6dB

Test room (semi-anechoic chamber)	Radiated emission (10m*)(+dB)		
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz
No.1	4.2dB	5.0dB	4.8dB
No.2	-	-	-
No.3	-	-	-
No.4	-	-	-

*10m = Measurement distance

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.3dB	5.0dB	5.1dB	4.9dB	5.8dB	4.4dB	4.3dB
No.2	4.3dB	5.2dB	5.1dB	5.0dB	5.7dB	4.3dB	4.2dB
No.3	4.6dB	5.0dB	5.1dB	5.0dB	5.7dB	4.5dB	4.2dB
No.4	4.8dB	5.2dB	5.0dB	5.0dB	5.7dB	5.2dB	4.2dB

*3m/1m/0.5m = Measurement distance

Power meter (+dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (+dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test(3m)

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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9
Paging

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping off) DH5, 3DH5 (Simultaneously)	2402MHz 2441MHz 2480MHz
Carrier Frequency Separation	Tx (Hopping on) DH5, 3DH5	2402MHz 2441MHz 2480MHz
	Paging	2440MHz
20dB Bandwidth	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
	Paging	2440MHz
Number of Hopping Frequency	Tx (Hopping on) DH5, 3DH5 Paging	-
Dwell time	Tx (Hopping on), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5	2441MHz
	Paging	2440MHz
Maximum Peak Output Power	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5	2402MHz
	-Hopping on -Hopping off	2480MHz
99% Occupied Bandwidth	Tx DH5, 3DH5	2402MHz
	-Hopping on	2441MHz
	-Hopping off	2480MHz
<p>*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test) *EUT has the power settings by the software as follows; Power settings: BDR/EDR: 8dBm LE: None (The power setting by the software was not possible) Software: Intel DRTU, Version 1.5.3-0335</p> <p>Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.</p>		

UL Japan, Inc.

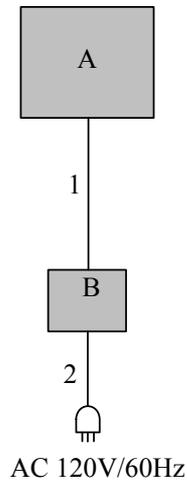
Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Personal Computer	SVD112A1WL	XTA2-1 3 *1) XTD2-2 12 *2)	Sony Corporation	EUT
B	AC Adapter	VGP-AC10V8	1490488110000393	Sony Corporation	EUT

*1) Used for Conducted emission and Radiated emission tests

*2) Used for Antenna terminal conducted test

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.7	Unshielded	Unshielded	-
2	AC Cable	1.5	Unshielded	Unshielded	-

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.

The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber .

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Detector : QP and AV
Measurement range : 0.15-30MHz
Test data : APPENDIX
Test result : Pass

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 6: Radiated Spurious Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, raised 0.8m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

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

Test Antennas are used as below;

Frequency	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted 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.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 5 of RSS-Gen 7.2.5 (IC) and outside the restricted band of FCC15.205 / Table 3 of RSS-Gen 7.2.2 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz *1)	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz)		3m (below 10GHz), 1m*2) (above 10GHz)

*1) Although 00-705 accepts VBW=10Hz for AV measurements, it was confirmed that superfluous smoothing was not performed.”

*2) Distance Factor: $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-26.5GHz
Test data : APPENDIX
Test result : Pass

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	3MHz 2.5MHz(Paging)	30kHz	100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Sample	Clear Write (Gate function was used)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	5MHz or 3MHz	100kHz or 30kHz	300kHz or 100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30MHz	300kHz	1MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100kHz, 1MHz	300kHz, 3MHz	As necessary capture the entire dwell time per hopping channel	Peak	Max Hold	Spectrum Analyzer
Conducted Spurious Emission *1)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				
Conducted Spurious Emission Band Edge compliance	20MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) 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 low enough as shown in the chart. (9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz).

*2) Testing using an average detector was performed in order to confirm that the output power of the EUT met the exclusion limits stated in FCC Part 2 Section 2.1093 and FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET 65 and the EUT was exempt from RF exposure SAR evaluation.

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : **APPENDIX**
Test result : **Pass**

APPENDIX 1: Data of EMI test

Conducted Emission

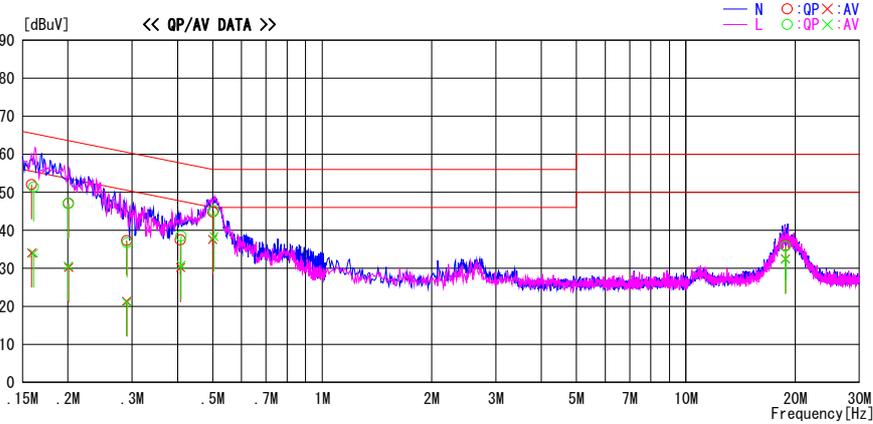
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/07/23

Report No. : 32KE0041-HO-02
 Power : AC 120V / 60Hz
 Temp./Humi. : 24 deg. C / 62% RH
 Engineer : Takumi Shimada

Mode / Remarks : BT Tx 2480MHz DH5

LIMIT : FCC15.207 QP
 FCC15.207 AV

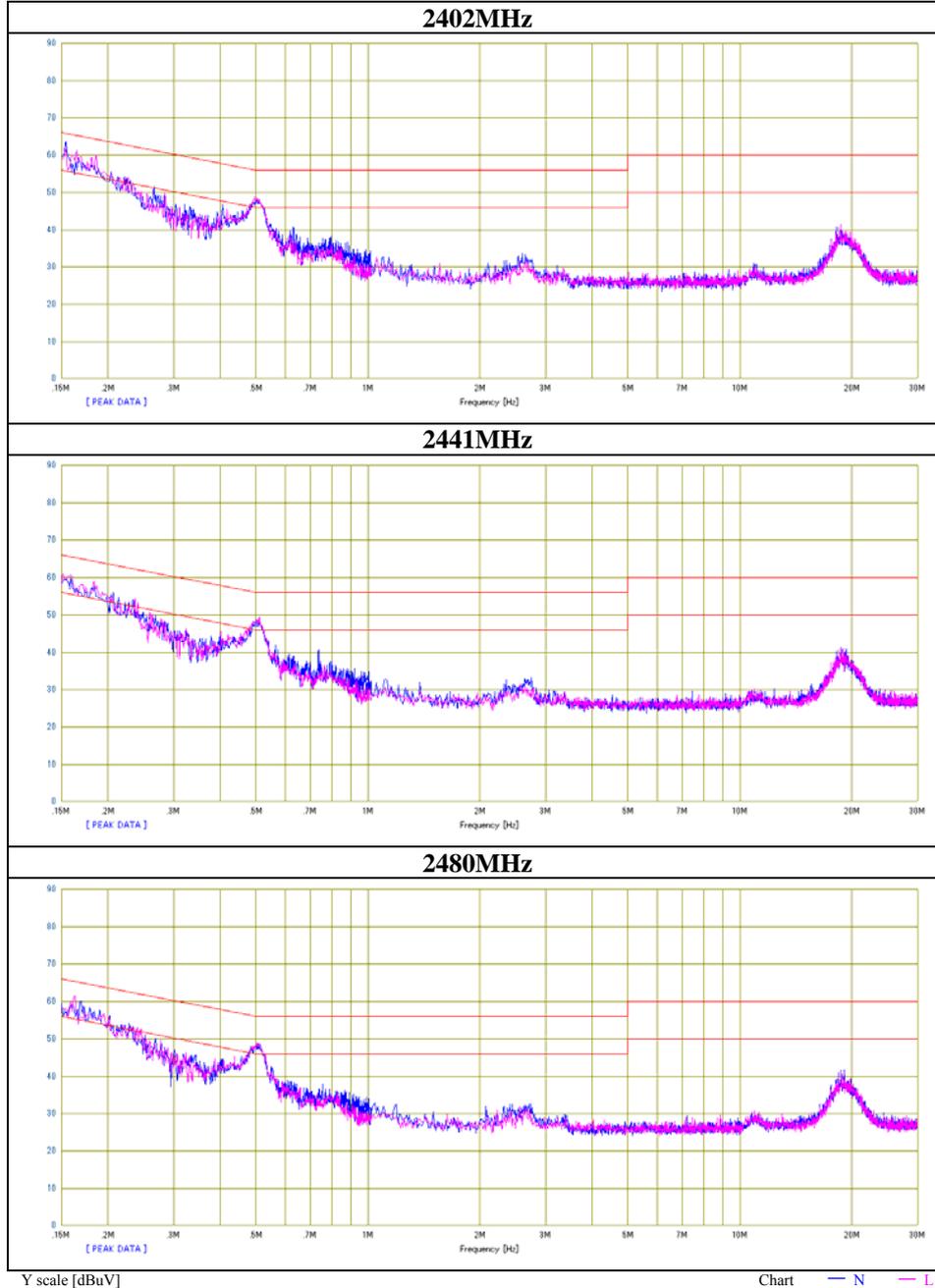


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15882	38.7	20.8	13.3	52.0	34.1	65.5	55.5	13.5	21.4	N	
0.20083	33.8	16.9	13.3	47.1	30.2	63.6	53.6	16.5	23.4	N	
0.28998	24.0	8.0	13.3	37.3	21.3	60.5	50.5	23.2	29.2	N	
0.40754	24.2	16.9	13.3	37.5	30.2	57.7	47.7	20.2	17.5	N	
0.50003	31.5	24.3	13.3	44.8	37.6	56.0	46.0	11.2	8.4	N	
18.78045	21.4	17.9	14.6	36.0	32.5	60.0	50.0	24.0	17.5	N	
0.16092	38.1	20.7	13.3	51.4	34.0	65.4	55.4	14.0	21.4	L	
0.20027	33.7	17.3	13.3	47.0	30.6	63.6	53.6	16.6	23.0	L	
0.29042	23.4	7.8	13.3	36.7	21.1	60.5	50.5	23.8	29.4	L	
0.40972	25.2	17.6	13.3	38.5	30.9	57.7	47.7	19.2	16.8	L	
0.50408	31.8	25.0	13.3	45.1	38.3	56.0	46.0	10.9	7.7	L	
18.78165	21.2	17.8	14.6	35.8	32.4	60.0	50.0	24.2	17.6	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F.(LISN LOSS+ATT LOSS +CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32KE0041-HO-02
Date	07/23/2012
Temperature/ Humidity	24 deg.C/ 62% RH
Engineer	Takumi Shimada
Mode	Tx DH5



Conducted Emission

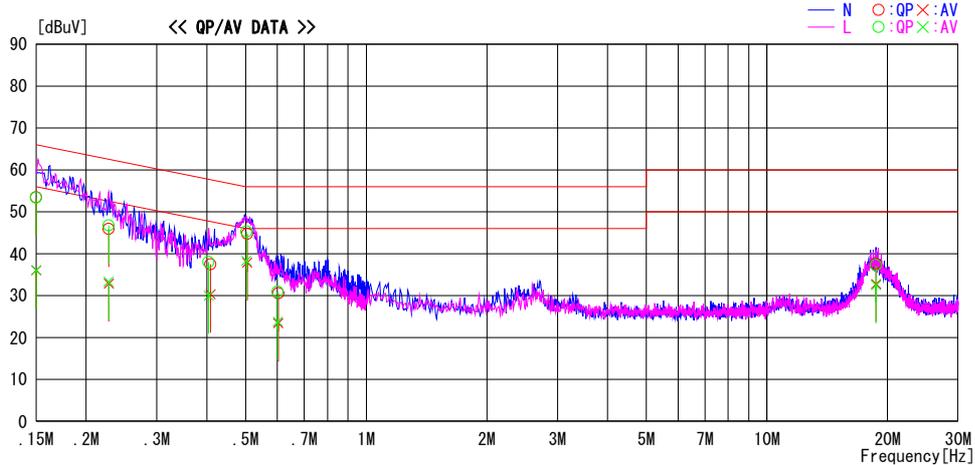
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
 Date : 2012/07/23

Report No. : 32KE0041-HO-02
 Power : AC 120V / 60Hz
 Temp./Humi. : 24 deg. C / 62% RH
 Engineer : Takumi Shimada

Mode / Remarks : BT Tx 2480MHz 3DH5

LIMIT : FCC15. 207 QP
 FCC15. 207 AV

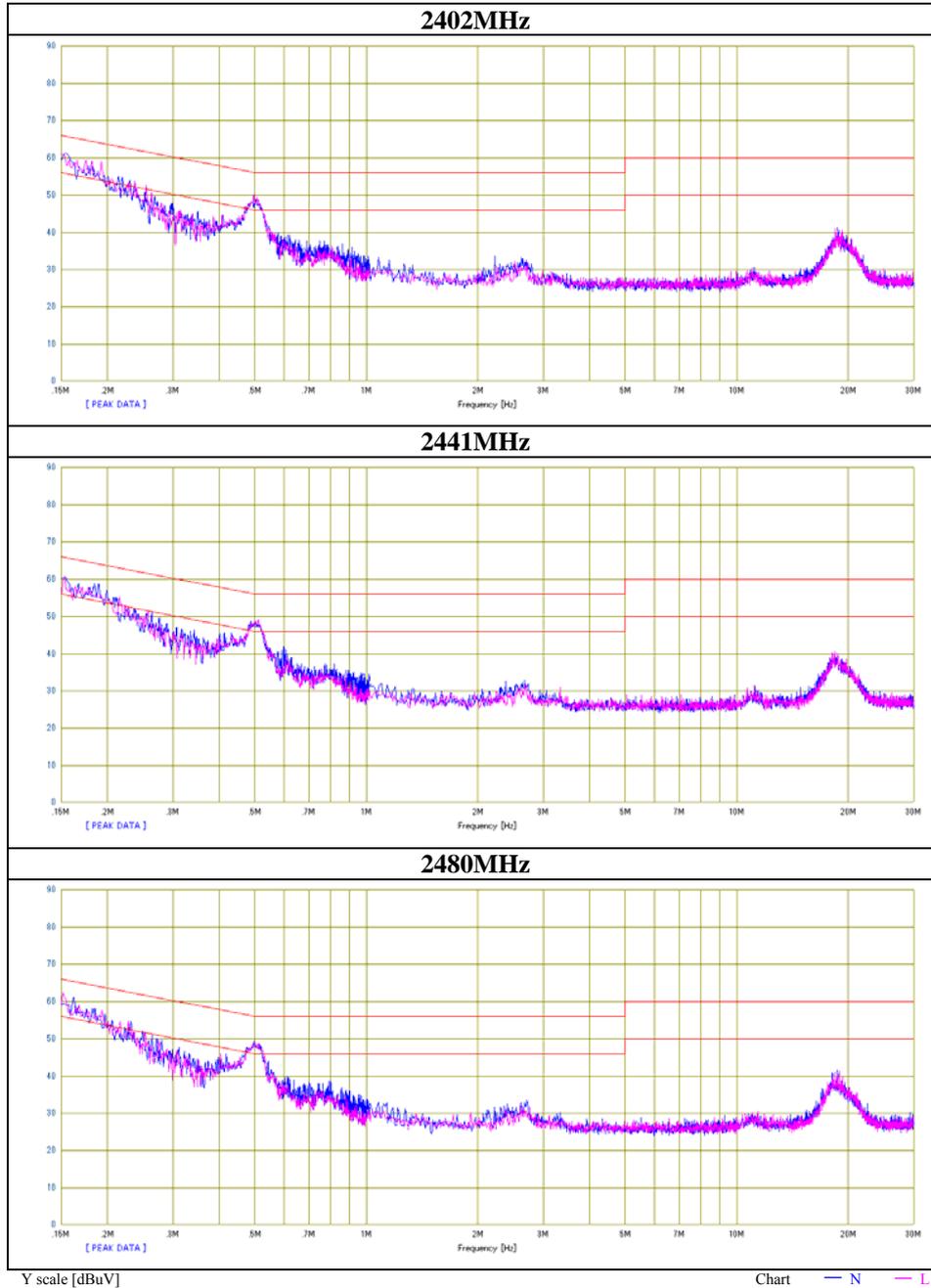


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	40.2	22.8	13.3	53.5	36.1	66.0	56.0	12.5	19.9	N	
0.22778	32.6	19.6	13.3	45.9	32.9	62.5	52.5	16.6	19.6	N	
0.40848	24.2	17.0	13.3	37.5	30.3	57.7	47.7	20.2	17.4	N	
0.50465	31.4	24.6	13.3	44.7	37.9	56.0	46.0	11.3	8.1	N	
0.60315	17.3	10.1	13.3	30.6	23.4	56.0	46.0	25.4	22.6	N	
18.71623	23.0	18.2	14.6	37.6	32.8	60.0	50.0	22.4	17.2	N	
0.15000	40.1	22.8	13.3	53.4	36.1	66.0	56.0	12.6	19.9	L	
0.22738	33.4	20.0	13.3	46.7	33.3	62.5	52.5	15.8	19.2	L	
0.40400	24.7	16.7	13.3	38.0	30.0	57.8	47.8	19.8	17.8	L	
0.50234	32.0	25.0	13.3	45.3	38.3	56.0	46.0	10.7	7.7	L	
0.60100	17.6	10.5	13.3	30.9	23.8	56.0	46.0	25.1	22.2	L	
18.71626	22.7	17.9	14.6	37.3	32.5	60.0	50.0	22.7	17.5	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F.(LISN LOSS+ATT LOSS +CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32KE0041-HO-02
Date	07/23/2012
Temperature/ Humidity	24 deg.C/ 62% RH
Engineer	Takumi Shimada
Mode	Tx 3DH5

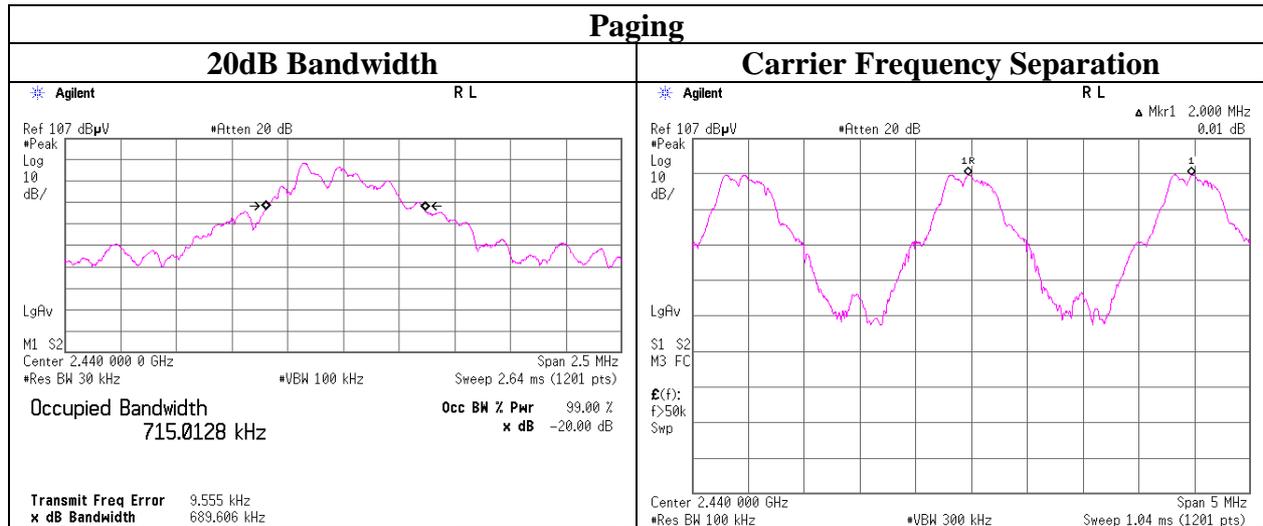


20dB Bandwidth and Carrier Frequency Separation

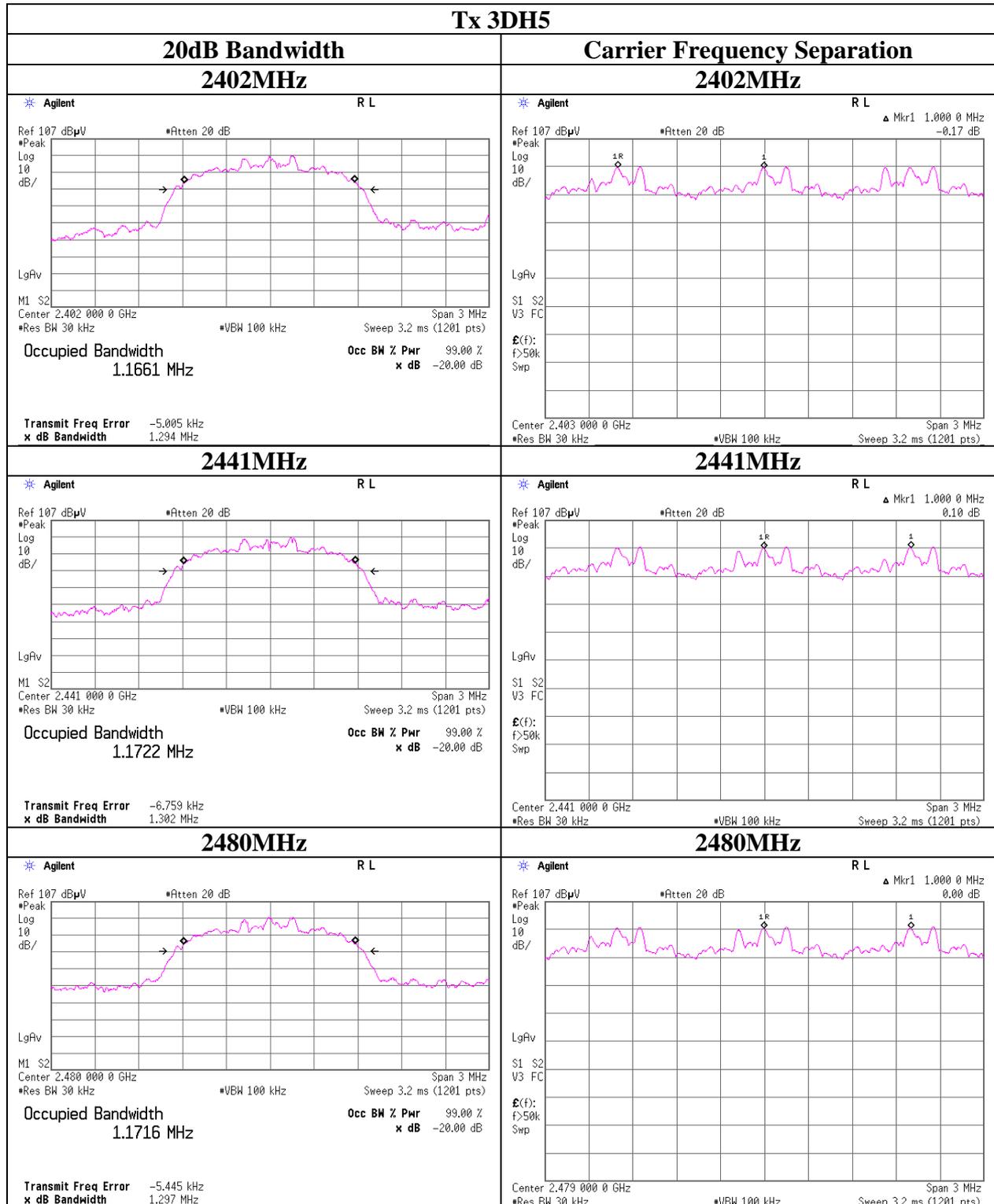
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	32KE0041-HO-02
Date	08/07/2012
Temperature/ Humidity	26deg. C / 65% RH
Engineer	Yutaka Yoshida
Mode	Tx (Hopping on) DH5/3DH5/Paging

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.957	1.000	≧ 0.638
DH5	2441.0	0.958	1.000	≧ 0.639
DH5	2480.0	0.960	1.000	≧ 0.640
3DH5	2402.0	1.294	1.000	≧ 0.863
3DH5	2441.0	1.302	1.000	≧ 0.868
3DH5	2480.0	1.297	1.000	≧ 0.865
Paging	2440.0	0.690	2.000	≧ 0.460

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



20dB Bandwidth and Carrier Frequency Separation

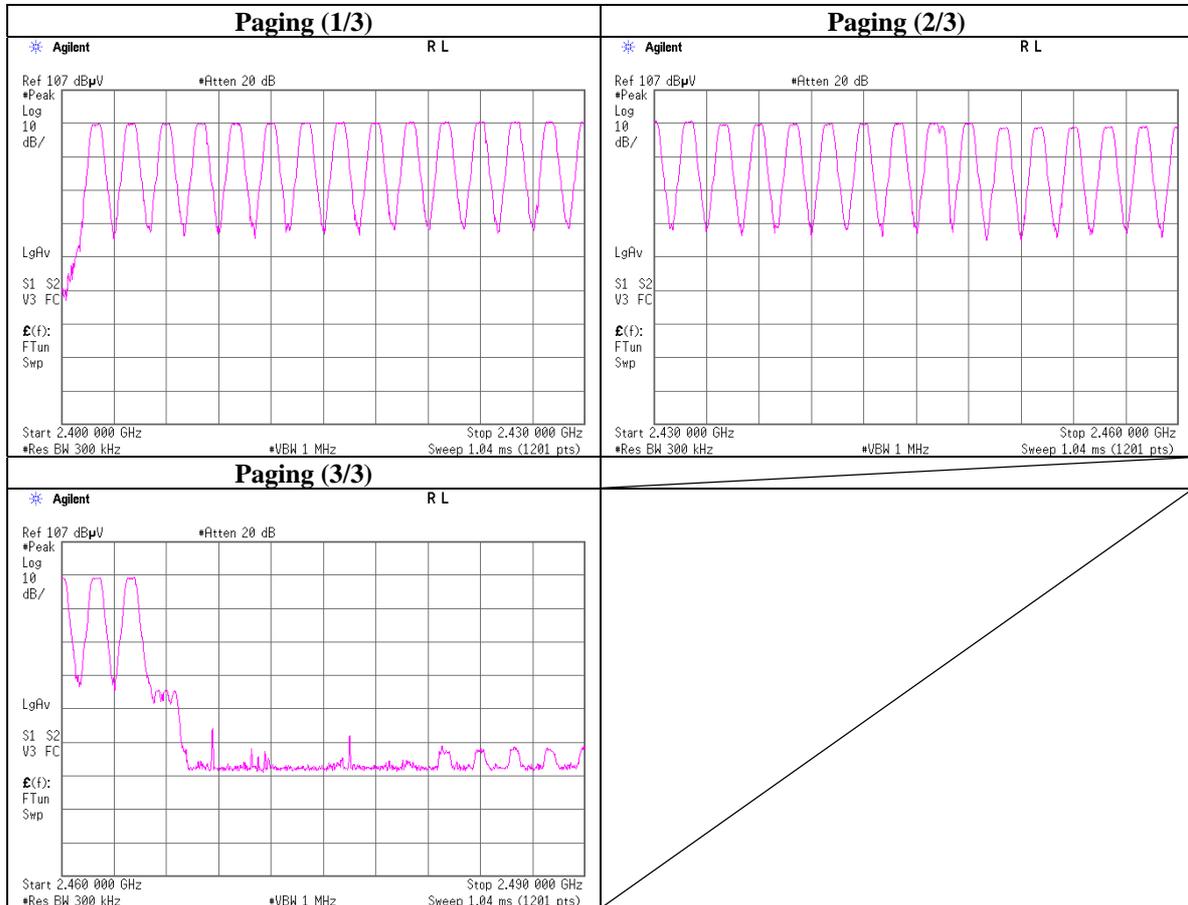


Number of Hopping Frequency

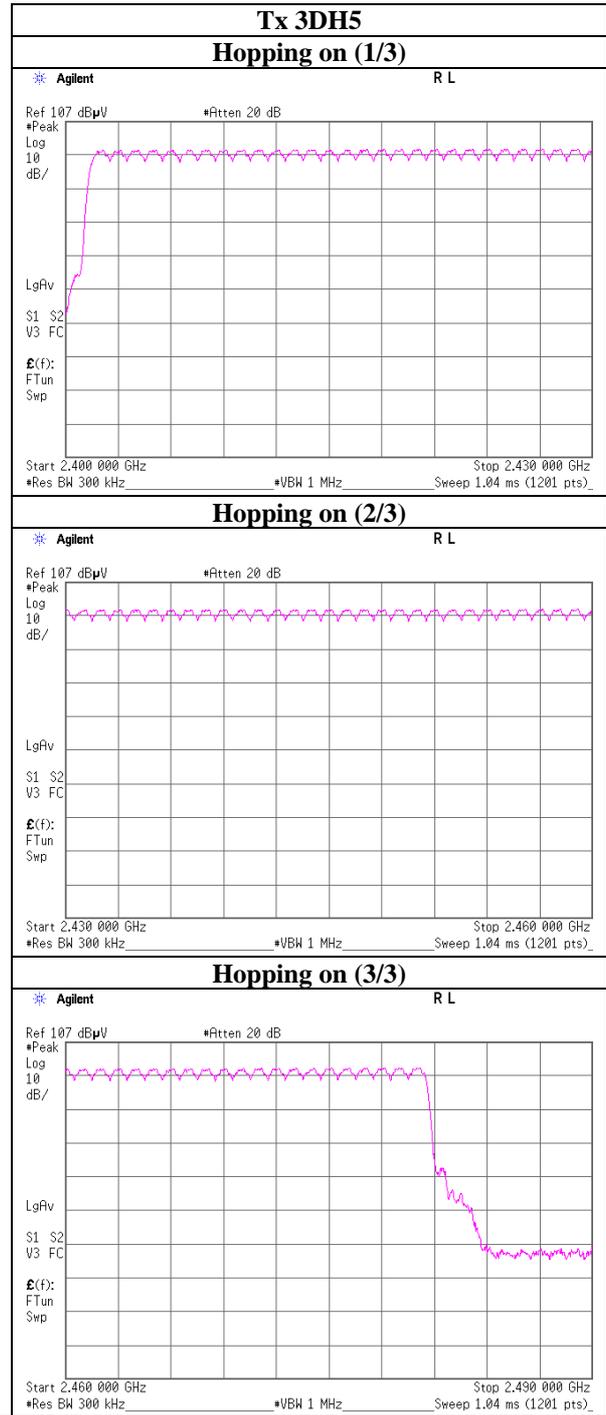
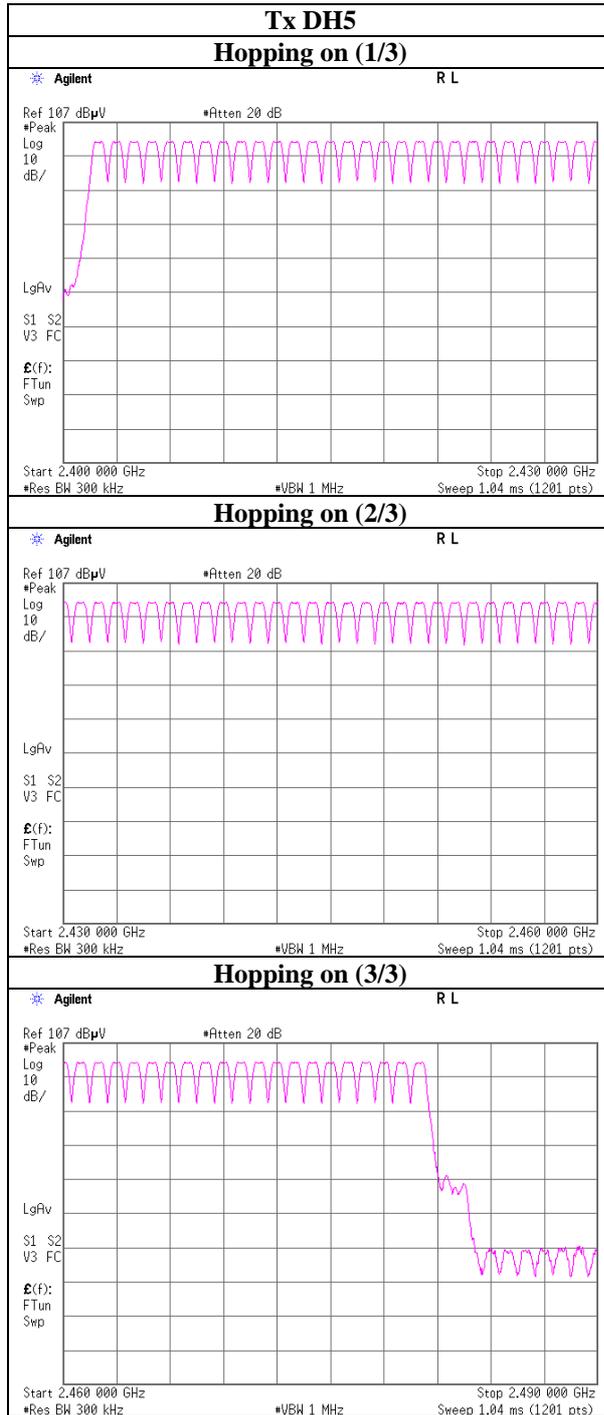
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	32KE0041-HO-02
Date	08/07/2012
Temperature/ Humidity	26deg. C/ 65% RH
Engineer	Yutaka Yoshida
Mode	Tx (Hopping on) DH5/3DH5/Paging

Mode	Number of channel [times]	Limit [times]
DH5	79	>= 15
3DH5	79	>= 15
Paging	32	>= 15

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



Number of Hopping Frequency



Dwell time

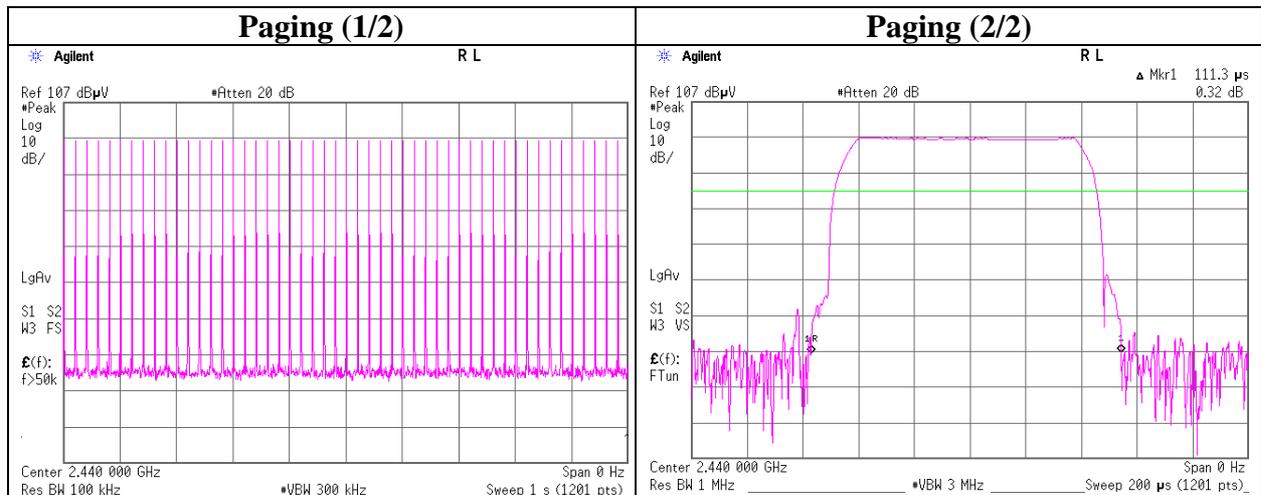
Test place : Head Office EMC Lab. No.11 Measurement Room
 Report No. : 32KE0041-HO-02
 Date : 08/07/2012
 Temperature/ Humidity : 24deg. C / 65% RH
 Engineer : Yutaka Yoshida
 Mode : Tx (Hopping on) DH5/3DH5/Paging

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	102 times / 5 sec. x 31.6 sec. = 645 times	0.419	270	400
DH3	34 times / 5 sec. x 31.6 sec. = 215 times	1.684	362	400
DH5	21 times / 5 sec. x 31.6 sec. = 133 times	2.934	390	400
3DH1	101 times / 5 sec. x 31.6 sec. = 639 times	0.432	276	400
3DH3	34 times / 5 sec. x 31.6 sec. = 215 times	1.689	363	400
3DH5	21 times / 5 sec. x 31.6 sec. = 133 times	2.947	392	400
Paging	49 times / 1 sec. x 12.8 sec. = 628 times	0.111	70	400

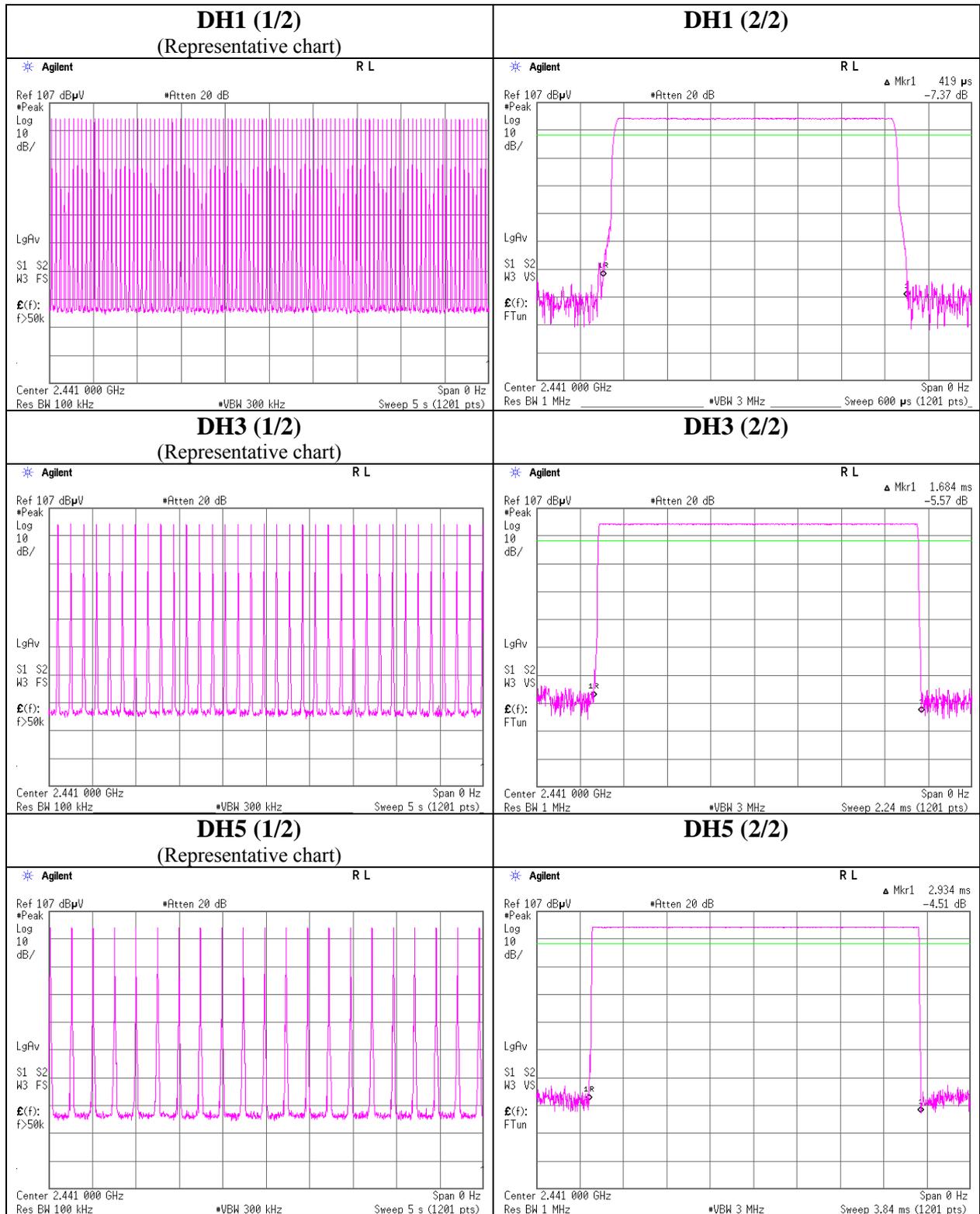
Sample Calculation

Result = Number of transmission x Length of transmission time

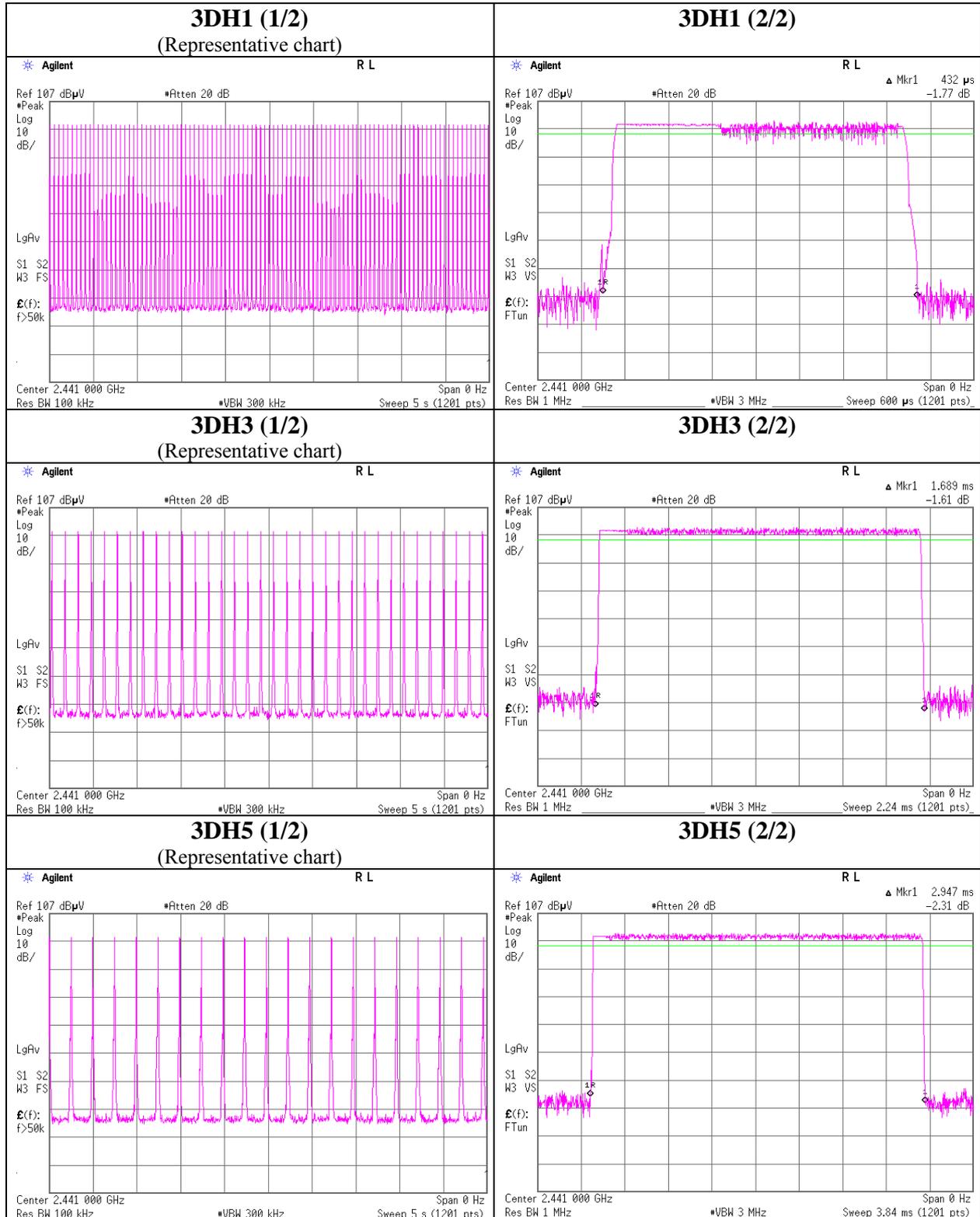
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in $N \times 0.4s$, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s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



Dwell time



Dwell time



Maximum Peak Output Power

Test place : Head Office EMC Lab. No.6 Measurement Room
Report No. : 32KE0041-HO-02
Date : 08/03/2012
Temperature/ Humidity : 24deg. C/ 68% RH
Engineer : Satofumi Matsuyama
Mode : Tx (Hopping off) DH5/3DH5

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-4.40	1.33	10.00	6.93	4.93	20.96	125	14.03
DH5	2441.0	-4.39	1.36	10.00	6.97	4.98	20.96	125	13.99
DH5	2480.0	-4.35	1.46	10.00	7.11	5.14	20.96	125	13.85
3DH5	2402.0	-5.74	1.33	10.00	5.59	3.62	20.96	125	15.37
3DH5	2441.0	-5.42	1.36	10.00	5.94	3.93	20.96	125	15.02
3DH5	2480.0	-5.13	1.46	10.00	6.33	4.29	20.96	125	14.63

Sample Calculation:

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

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.

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.

Average Output Power

(for reporting purpose only)

Test place : Head Office EMC Lab. No.11 Measurement Room
Report No. : 32KE0041-HO-02
Date : 08/07/2012
Temperature/ Humidity : 26deg. C/ 65% RH
Engineer : Yutaka Yoshida
Mode : Tx (Hopping off) DH5/3DH5

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-5.22	1.33	9.95	6.06	4.04	20.96	125	14.90
DH5	2441.0	-5.21	1.36	9.95	6.10	4.07	20.96	125	14.86
DH5	2480.0	-5.13	1.46	9.95	6.28	4.24	20.96	125	14.68
3DH5	2402.0	-9.33	1.33	9.95	1.95	1.57	20.96	125	19.01
3DH5	2441.0	-8.90	1.36	9.95	2.41	1.74	20.96	125	18.55
3DH5	2480.0	-8.36	1.46	9.95	3.05	2.02	20.96	125	17.91

Sample Calculation:

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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32KE0041-HO-02
Date 07/18/2012 07/19/2012
Temperature/ Humidity 22 deg.C/ 59% RH 21 deg.C/ 60% RH
Engineer Katsunori Okai Takumi Shimada
(1-26.5GHz) (30-1000MHz)
Mode Tx, DH5 2402MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	98.833	QP	29.2	9.4	7.5	28.4	17.7	43.5	25.8	
Hori	270.000	QP	34.0	18.0	8.7	27.6	33.1	46.0	12.9	
Hori	350.228	QP	35.4	16.0	9.1	28.0	32.5	46.0	13.5	
Hori	433.795	QP	35.6	17.7	9.5	28.4	34.4	46.0	11.6	
Hori	480.177	QP	40.6	18.1	9.7	28.7	39.7	46.0	6.3	
Hori	564.488	QP	29.9	19.3	10.0	28.8	30.4	46.0	15.6	
Hori	2322.000	PK	52.8	27.4	2.2	34.9	47.5	73.9	26.4	
Hori	2390.000	PK	50.0	27.4	2.2	34.8	44.8	73.9	29.1	
Hori	2522.000	PK	58.8	27.5	2.3	34.8	53.8	73.9	20.1	
Hori	2562.000	PK	57.5	27.6	2.3	34.8	52.6	73.9	21.3	
Hori	4804.000	PK	47.7	31.2	4.0	34.0	48.9	73.9	25.1	
Hori	7206.000	PK	46.9	35.9	4.6	34.2	53.2	73.9	20.7	
Vert	49.156	QP	31.1	11.4	7.0	28.6	20.9	40.0	19.1	
Vert	120.588	QP	34.8	12.7	7.7	28.3	26.9	43.5	16.6	
Vert	140.005	QP	44.8	14.3	7.8	28.2	38.7	43.5	4.8	
Vert	438.292	QP	38.8	17.7	9.5	28.5	37.5	46.0	8.5	
Vert	487.714	QP	41.2	18.2	9.7	28.7	40.4	46.0	5.6	
Vert	564.489	QP	32.7	19.3	10.0	28.8	33.2	46.0	12.8	
Vert	2322.000	PK	55.0	27.4	2.2	34.9	49.7	73.9	24.2	
Vert	2390.000	PK	52.2	27.4	2.2	34.8	47.0	73.9	26.9	
Vert	2522.000	PK	63.3	27.5	2.3	34.8	58.3	73.9	15.6	
Vert	2562.000	PK	61.1	27.6	2.3	34.8	56.2	73.9	17.7	
Vert	4804.000	PK	47.5	31.2	4.0	34.0	48.7	73.9	25.2	
Vert	7206.000	PK	45.5	35.9	4.6	34.2	51.8	73.9	22.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

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	107.7	27.5	2.2	34.8	102.6	-	-	- Carrier
Hori	2400.000	PK	58.6	27.5	2.2	34.8	53.5	82.6	29.1	
Vert	2402.000	PK	109.9	27.5	2.2	34.8	104.8	-	-	- Carrier
Vert	2400.000	PK	62.5	27.5	2.2	34.8	57.4	84.8	27.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2322.000	AV	48.1	27.4	2.2	34.9	-24.2	18.6	53.9	35.3	
Hori	2390.000	AV	33.2	27.4	2.2	34.8	-24.2	3.8	53.9	50.1	
Hori	2522.000	AV	57.0	27.5	2.3	34.8	-24.2	27.8	53.9	26.1	
Hori	2562.000	AV	55.1	27.6	2.3	34.8	-24.2	26.0	53.9	27.9	
Hori	4804.000	AV	39.6	31.2	4.0	34.0	-24.2	16.6	53.9	37.3	
Hori	7206.000	AV	37.5	35.9	4.6	34.2	-24.2	19.6	53.9	34.3	
Vert	2322.000	AV	51.3	27.4	2.2	34.9	-24.2	21.8	53.9	32.1	
Vert	2390.000	AV	33.6	27.4	2.2	34.8	-24.2	4.2	53.9	49.7	
Vert	2522.000	AV	61.9	27.5	2.3	34.8	-24.2	32.7	53.9	21.2	
Vert	2562.000	AV	59.0	27.6	2.3	34.8	-24.2	29.9	53.9	24.0	
Vert	4804.000	AV	39.5	31.2	4.0	34.0	-24.2	16.5	53.9	37.4	
Vert	7206.000	AV	34.8	35.9	4.6	34.2	-24.2	16.9	53.9	37.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz))

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32KE0041-HO-02
Date 07/18/2012 07/19/2012
Temperature/ Humidity 22 deg.C/ 59% RH 21 deg.C/ 60% RH
Engineer Katsunori Okai Takumi Shimada
(1-26.5GHz) (30-1000MHz)
Mode Tx, DH5 2441MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	98.829	QP	29.3	9.4	7.5	28.4	17.8	43.5	25.7	
Hori	270.000	QP	34.3	18.0	8.7	27.6	33.4	46.0	12.6	
Hori	350.321	QP	35.1	16.0	9.1	28.0	32.2	46.0	13.8	
Hori	433.783	QP	34.9	17.7	9.5	28.4	33.7	46.0	12.3	
Hori	480.164	QP	39.8	18.1	9.7	28.7	38.9	46.0	7.1	
Hori	564.488	QP	30.0	19.3	10.0	28.8	30.5	46.0	15.5	
Hori	2321.000	PK	57.8	27.4	2.2	34.9	52.5	73.9	21.4	
Hori	2521.000	PK	54.5	27.5	2.3	34.8	49.5	73.9	24.5	
Hori	2561.000	PK	61.3	27.6	2.3	34.8	56.4	73.9	17.5	
Hori	2601.000	PK	57.4	27.7	2.3	34.8	52.6	73.9	21.3	
Hori	4882.000	PK	47.4	31.4	3.9	34.0	48.7	73.9	25.2	
Hori	7323.000	PK	46.9	36.0	4.7	34.2	53.4	73.9	20.5	
Vert	49.146	QP	31.3	11.4	7.0	28.6	21.1	40.0	18.9	
Vert	120.643	QP	34.3	12.7	7.7	28.3	26.4	43.5	17.1	
Vert	140.003	QP	45.3	14.3	7.8	28.2	39.2	43.5	4.3	
Vert	436.975	QP	42.1	17.7	9.5	28.5	40.8	46.0	5.2	
Vert	487.350	QP	40.8	18.2	9.7	28.7	40.0	46.0	6.0	
Vert	564.488	QP	32.4	19.3	10.0	28.8	32.9	46.0	13.1	
Vert	2321.000	PK	62.2	27.4	2.2	34.9	56.9	73.9	17.0	
Vert	2521.000	PK	57.1	27.5	2.3	34.8	52.1	73.9	21.8	
Vert	2561.000	PK	63.3	27.6	2.3	34.8	58.4	73.9	15.5	
Vert	2601.000	PK	59.8	27.7	2.3	34.8	55.0	73.9	18.9	
Vert	4882.000	PK	47.1	31.4	3.9	34.0	48.4	73.9	25.5	
Vert	7323.000	PK	45.9	36.0	4.7	34.2	52.4	73.9	21.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2321.000	AV	55.3	27.4	2.2	34.9	-24.2	25.8	53.9	28.1	
Hori	2521.000	AV	51.2	27.5	2.3	34.8	-24.2	22.0	53.9	31.9	
Hori	2561.000	AV	59.3	27.6	2.3	34.8	-24.2	30.2	53.9	23.7	
Hori	2601.000	AV	54.8	27.7	2.3	34.8	-24.2	25.8	53.9	28.1	
Hori	4882.000	AV	39.6	31.4	3.9	34.0	-24.2	16.7	53.9	37.2	
Hori	7323.000	AV	37.8	36.0	4.7	34.2	-24.2	20.1	53.9	33.8	
Vert	2321.000	AV	60.3	27.4	2.2	34.9	-24.2	30.8	53.9	23.1	
Vert	2521.000	AV	54.4	27.5	2.3	34.8	-24.2	25.2	53.9	28.7	
Vert	2561.000	AV	61.9	27.6	2.3	34.8	-24.2	32.8	53.9	21.1	
Vert	2601.000	AV	57.6	27.7	2.3	34.8	-24.2	28.6	53.9	25.3	
Vert	4882.000	AV	39.4	31.4	3.9	34.0	-24.2	16.5	53.9	37.4	
Vert	7323.000	AV	34.8	36.0	4.7	34.2	-24.2	17.1	53.9	36.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz))

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32KE0041-HO-02
Date 07/18/2012 07/19/2012
Temperature/ Humidity 22 deg.C/ 59% RH 21 deg.C/ 60% RH
Engineer Katsunori Okai Takumi Shimada
(1-10GHz) (30-1000MHz)
Mode Tx, 3DH5 2480MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	98.992	QP	29.5	9.4	7.5	28.4	18.0	43.5	25.5	
Hori	270.002	QP	29.8	18.0	8.7	27.6	28.9	46.0	17.1	
Hori	352.535	QP	35.7	16.0	9.2	28.0	32.9	46.0	13.1	
Hori	433.991	QP	37.6	17.7	9.5	28.5	36.3	46.0	9.7	
Hori	479.999	QP	35.5	18.1	9.7	28.7	34.6	46.0	11.4	
Hori	564.479	QP	30.1	19.3	10.0	28.8	30.6	46.0	15.4	
Hori	2360.000	PK	54.7	27.4	2.2	34.9	49.4	73.9	24.5	
Hori	2483.500	PK	62.1	27.5	2.3	34.8	57.1	73.9	16.8	
Hori	2600.000	PK	60.7	27.7	2.3	34.8	55.9	73.9	18.0	
Hori	4960.000	PK	47.9	31.6	4.0	34.0	49.5	73.9	24.4	
Vert	49.144	QP	30.6	11.4	7.0	28.6	20.4	40.0	19.6	
Vert	121.611	QP	34.9	12.8	7.7	28.3	27.1	43.5	16.4	
Vert	140.013	QP	41.1	14.3	7.8	28.2	35.0	43.5	8.5	
Vert	437.065	QP	41.6	17.7	9.5	28.5	40.3	46.0	5.7	
Vert	487.550	QP	39.6	18.2	9.7	28.7	38.8	46.0	7.2	
Vert	564.488	QP	32.8	19.3	10.0	28.8	33.3	46.0	12.7	
Vert	2360.000	PK	58.2	27.4	2.2	34.9	52.9	73.9	21.0	
Vert	2483.500	PK	69.6	27.5	2.3	34.8	64.6	73.9	9.3	
Vert	2600.000	PK	64.3	27.7	2.3	34.8	59.5	73.9	14.4	
Vert	4960.000	PK	46.6	31.6	4.0	34.0	48.2	73.9	25.7	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2360.000	AV	49.8	27.4	2.2	34.9	-24.2	20.3	53.9	33.6	
Hori	2483.500	AV	48.5	27.5	2.3	34.8	-24.2	19.3	53.9	34.6	
Hori	2600.000	AV	53.4	27.7	2.3	34.8	-24.2	24.4	53.9	29.5	
Hori	4960.000	AV	39.6	31.6	4.0	34.0	-24.2	17.0	53.9	36.9	
Vert	2360.000	AV	53.2	27.4	2.2	34.9	-24.2	23.7	53.9	30.2	
Vert	2483.500	AV	53.5	27.5	2.3	34.8	-24.2	24.3	53.9	29.6	
Vert	2600.000	AV	58.6	27.7	2.3	34.8	-24.2	29.6	53.9	24.3	
Vert	4960.000	AV	37.6	31.6	4.0	34.0	-24.2	15.0	53.9	38.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz))

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32KE0041-HO-02
Date : 08/03/2012
Temperature/ Humidity : 22 deg.C/ 59% RH
Engineer : Tomotaka Sasagawa

Mode : 11n40(MIMO) Tx 5755MHz + BT Hopping

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	98.543	QP	35.0	9.6	8.3	38.9	14.0	43.5	29.5	
Hori	140.092	QP	45.2	14.4	8.8	38.9	29.5	43.5	14.0	
Hori	315.982	QP	38.7	14.9	10.5	38.6	25.5	46.0	20.5	
Hori	338.223	QP	41.9	15.7	10.7	38.5	29.8	46.0	16.2	
Hori	445.231	QP	38.7	17.9	11.5	38.3	29.8	46.0	16.2	
Hori	474.230	QP	43.9	18.0	11.7	38.2	35.4	46.0	10.6	
Hori	2483.500	PK	51.9	27.7	2.2	32.3	49.5	73.9	24.5	
Hori	2483.500	AV	39.6	27.7	2.2	32.3	37.2	53.9	16.7	
Vert	98.920	QP	42.1	9.8	8.3	38.9	21.3	43.5	22.2	
Vert	122.762	QP	45.1	13.1	8.6	38.9	27.9	43.5	15.6	
Vert	260.231	QP	32.1	17.9	10.0	38.7	21.3	46.0	24.7	
Vert	426.231	QP	47.2	17.8	11.4	38.3	38.1	46.0	7.9	
Vert	484.032	QP	47.8	18.1	11.8	38.2	39.5	46.0	6.5	
Vert	565.231	QP	32.9	19.0	12.2	38.1	26.0	46.0	20.0	
Vert	2483.500	PK	50.8	27.7	2.2	32.3	48.4	73.9	25.6	
Vert	2483.500	AV	37.5	27.7	2.2	32.3	35.1	53.9	18.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ant)

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

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

20dBc Data Sheet

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	106.8	27.5	2.2	32.4	104.1	-	-	Carrier
Hori	2400.000	PK	51.2	27.4	2.2	32.4	48.4	84.1	35.7	
Vert	2402.000	PK	105.9	27.5	2.2	32.4	103.2	-	-	Carrier
Vert	2400.000	PK	52.2	27.4	2.2	32.4	49.4	83.2	33.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 32KE0041-HO-02
Date : 08/03/2012
Temperature/ Humidity : 22 deg.C/ 59% RH
Engineer : Tomotaka Sasagawa

Mode : 11n40(MIMO) Tx 5795MHz + BT Hopping

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	52.1	27.7	2.2	32.3	49.7	73.9	24.5	
Hori	2483.500	AV	38.9	27.7	2.2	32.3	36.5	53.9	16.7	
Vert	2483.500	PK	51.2	27.7	2.2	32.3	48.8	73.9	25.6	
Vert	2483.500	AV	37.8	27.7	2.2	32.3	35.4	53.9	18.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ant)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

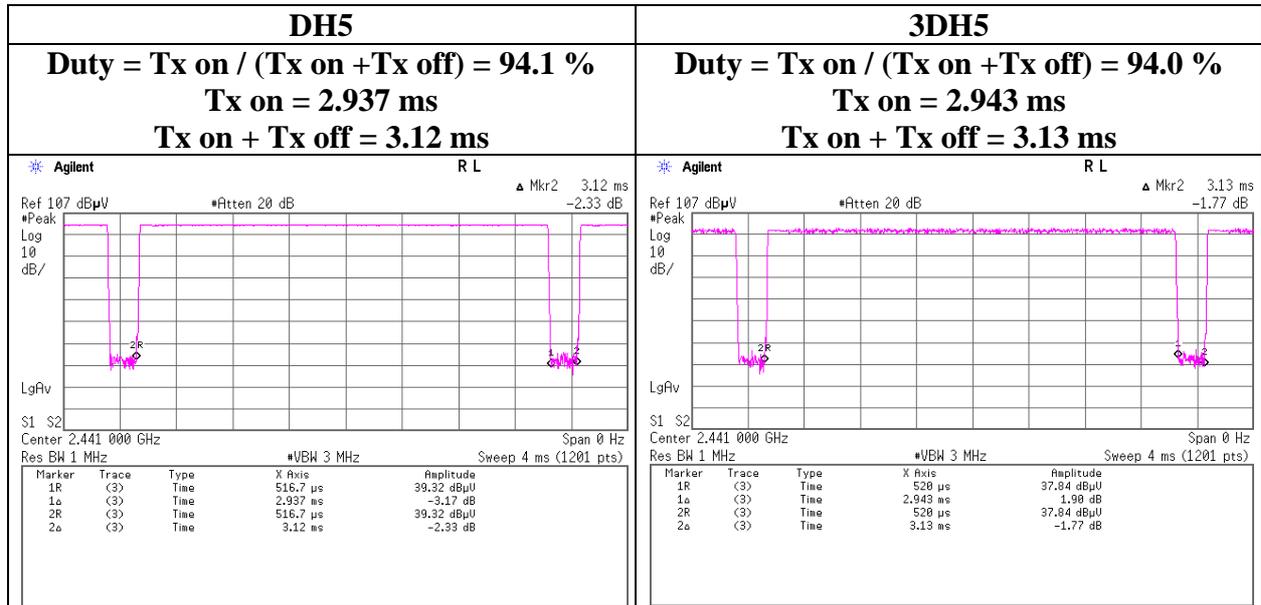
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

20dBc Data Sheet

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	106.9	27.5	2.2	32.4	104.2	-	-	Carrier
Hori	2400.000	PK	51.2	27.4	2.2	32.4	48.4	84.2	35.8	
Vert	2402.000	PK	105.9	27.5	2.2	32.4	103.2	-	-	Carrier
Vert	2400.000	PK	52.2	27.4	2.2	32.4	49.4	83.2	33.8	

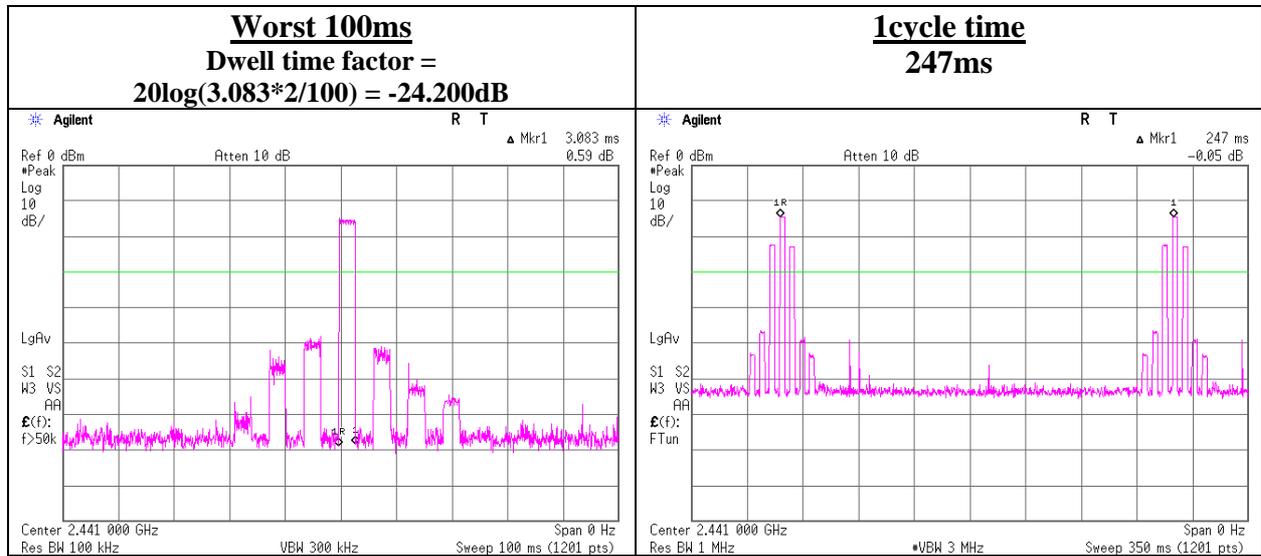
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Duty cycle confirmation for continuous Tx

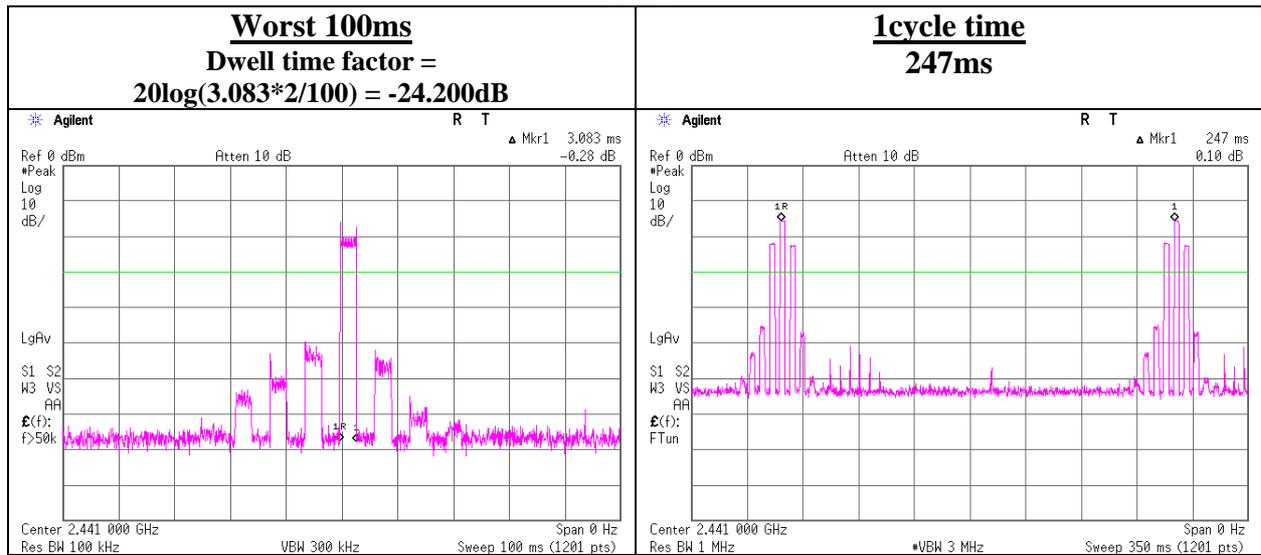


Dwell time factor

DH5

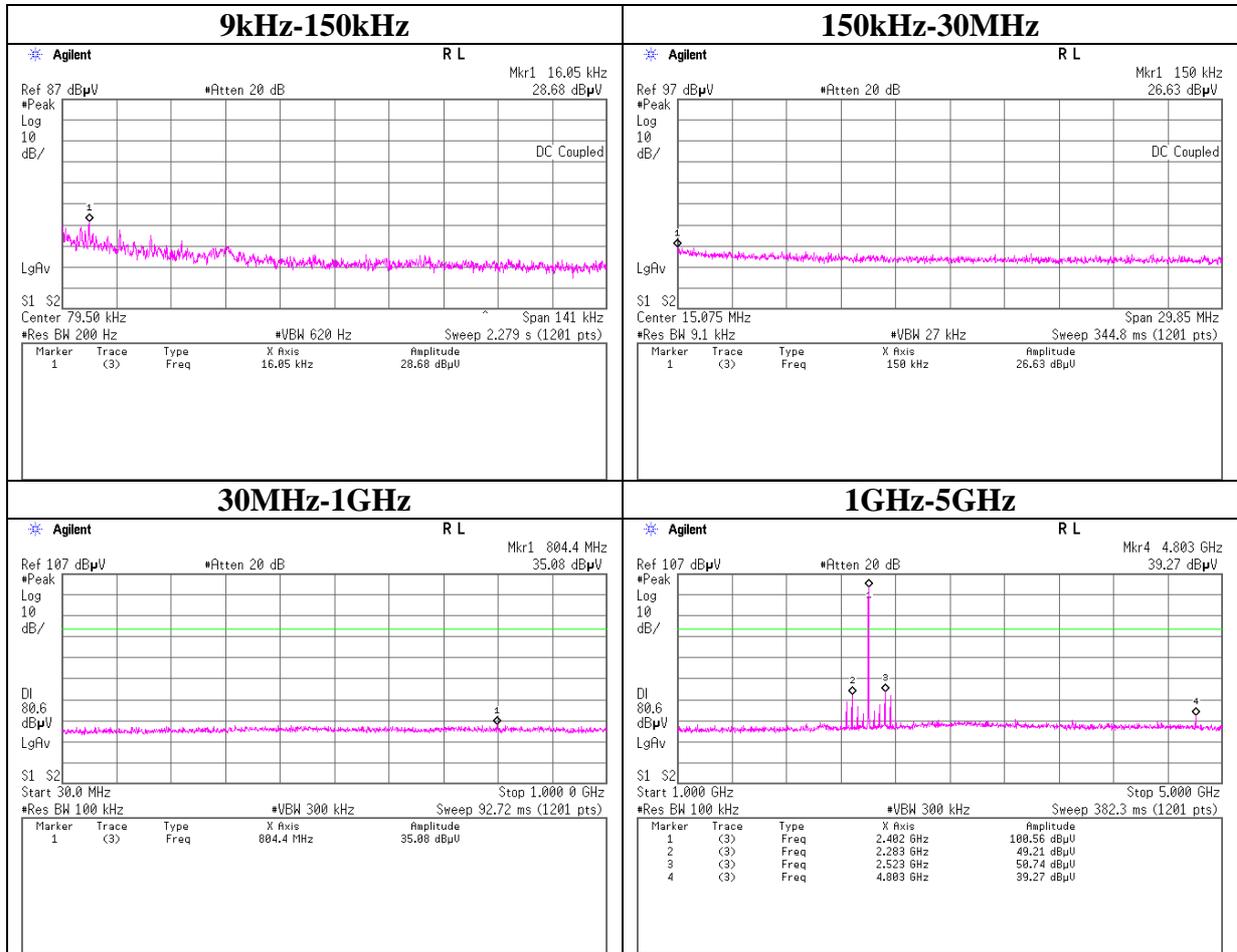


3DH5



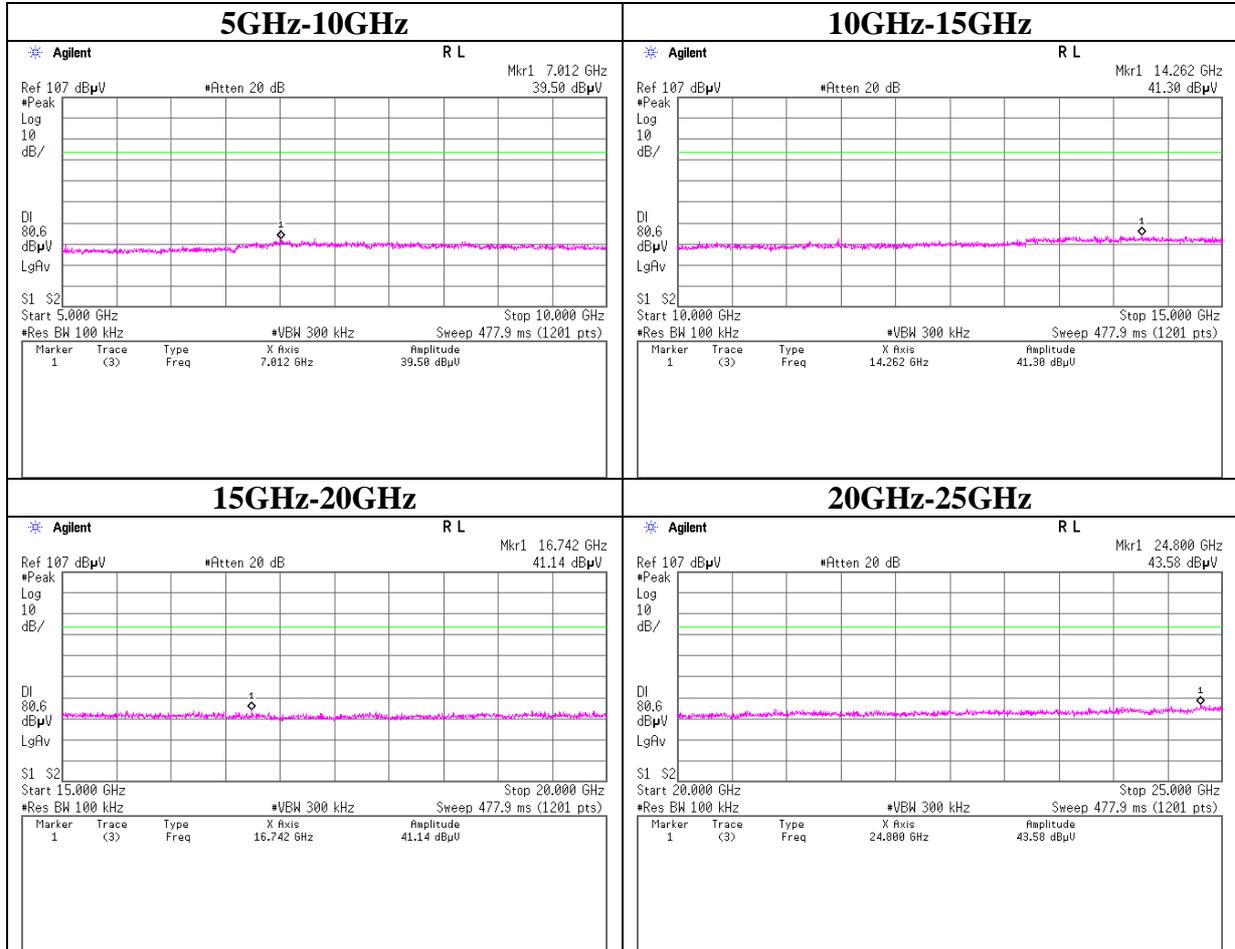
Conducted Spurious Emission

Tx DH5 2402MHz



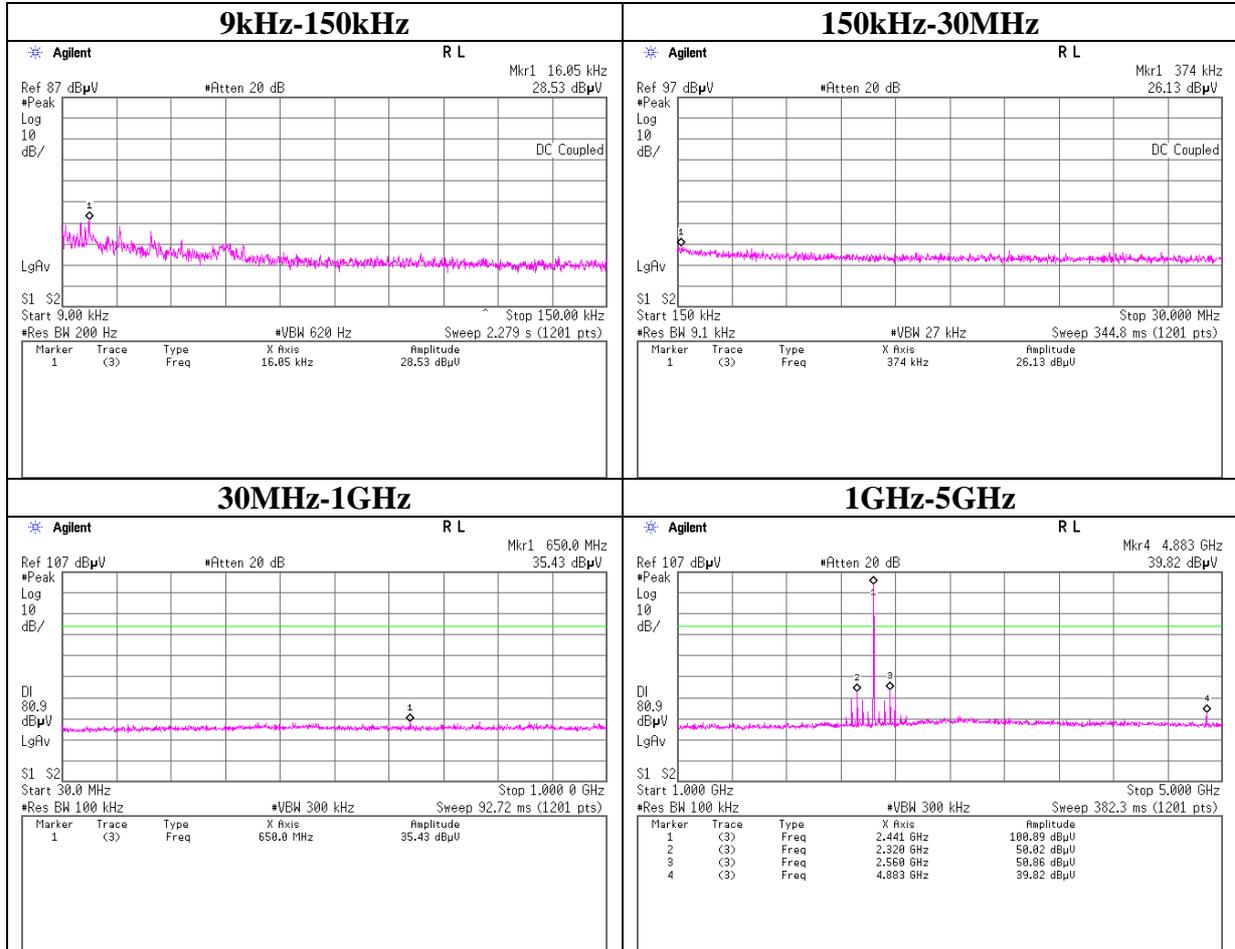
Conducted Spurious Emission

Tx DH5 2402MHz



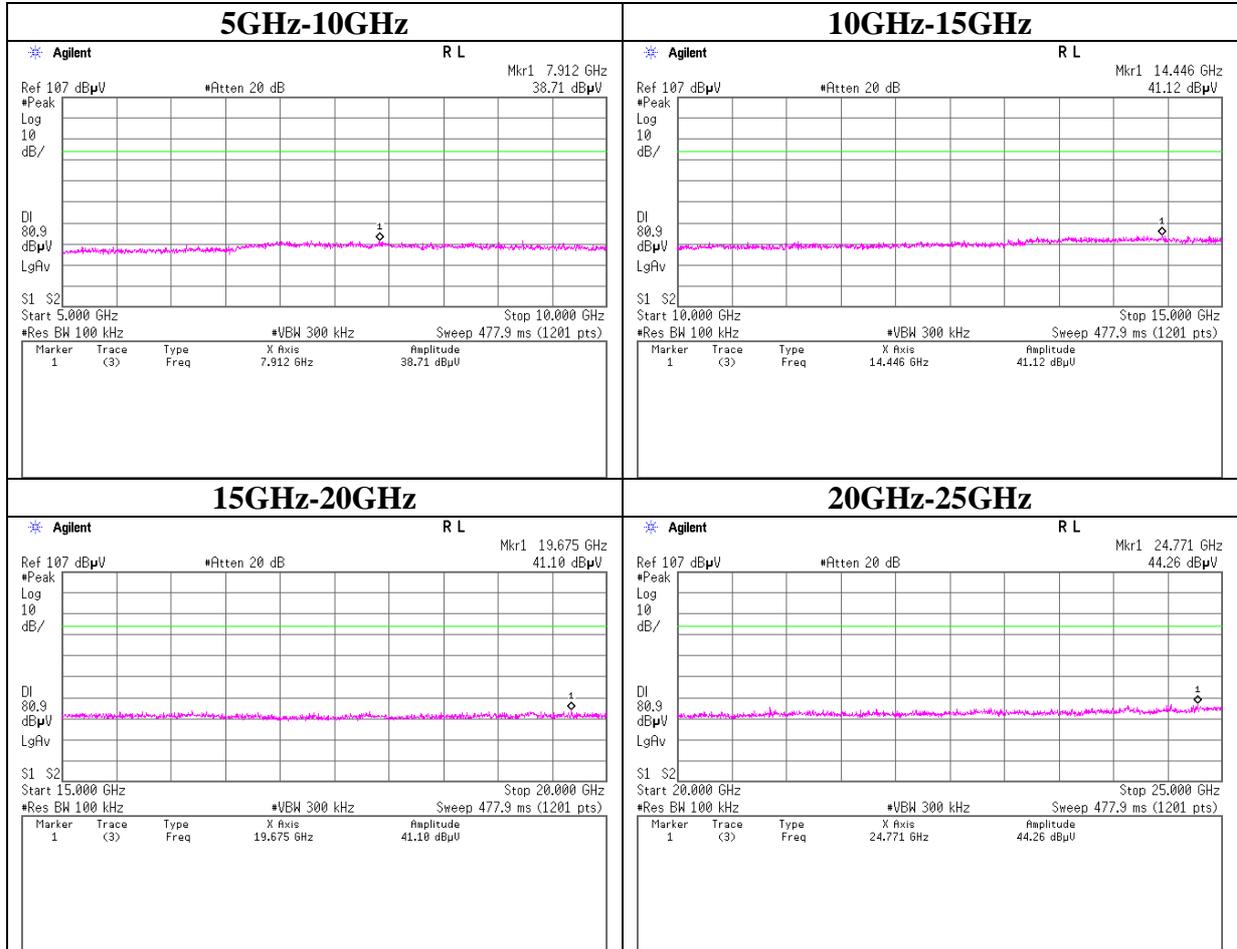
Conducted Spurious Emission

Tx DH5 2441MHz



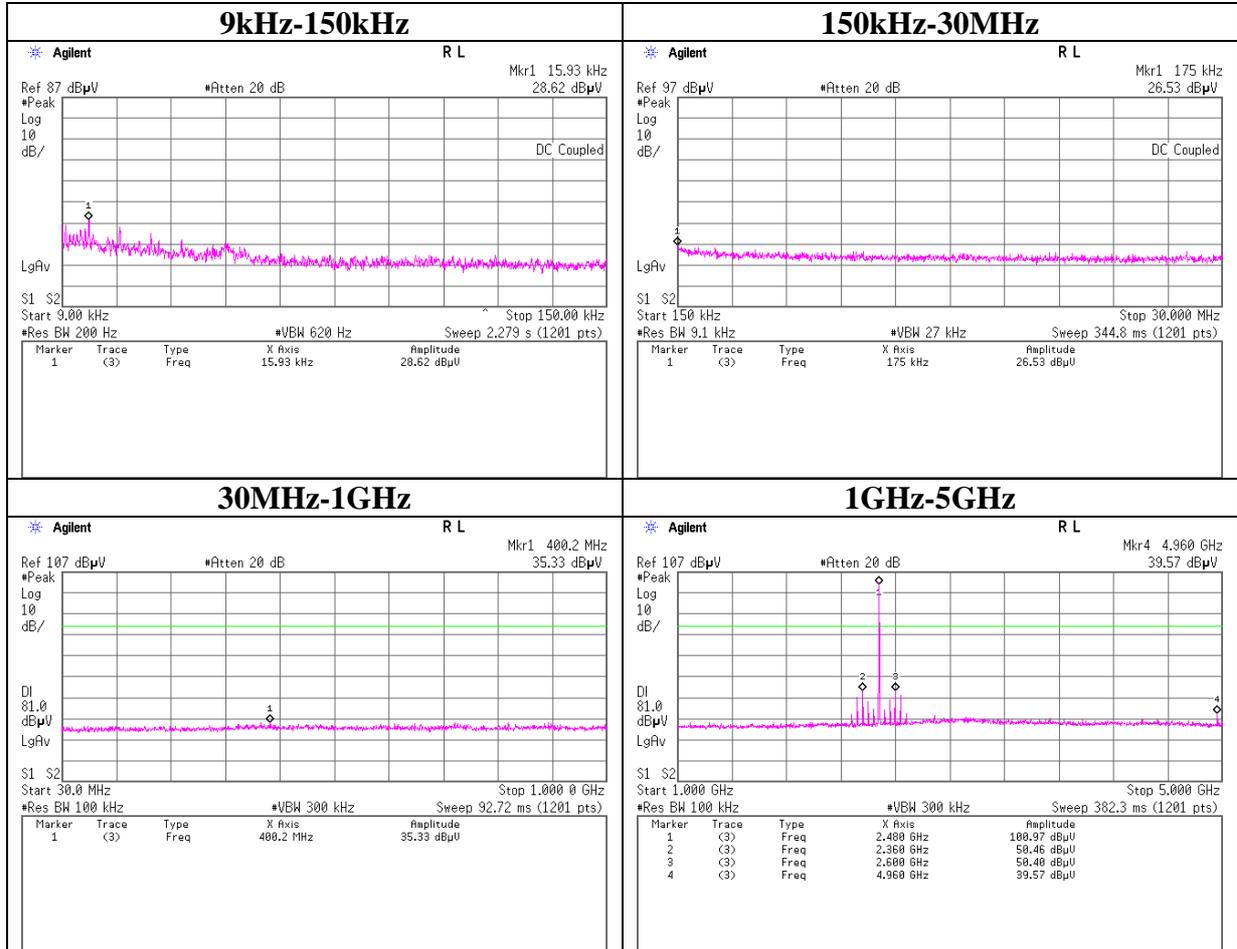
Conducted Spurious Emission

Tx DH5 2441MHz



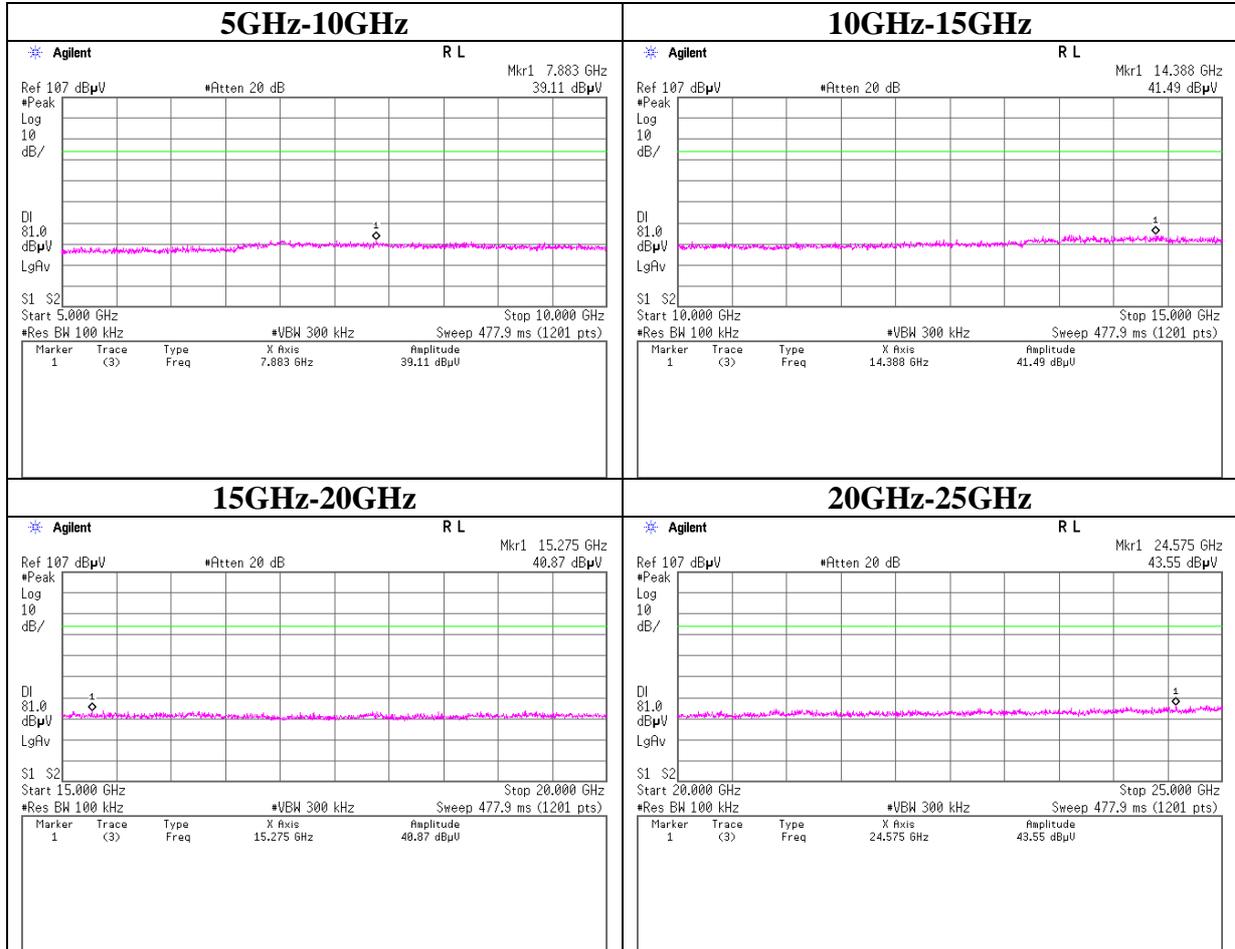
Conducted Spurious Emission

Tx DH5 2480MHz



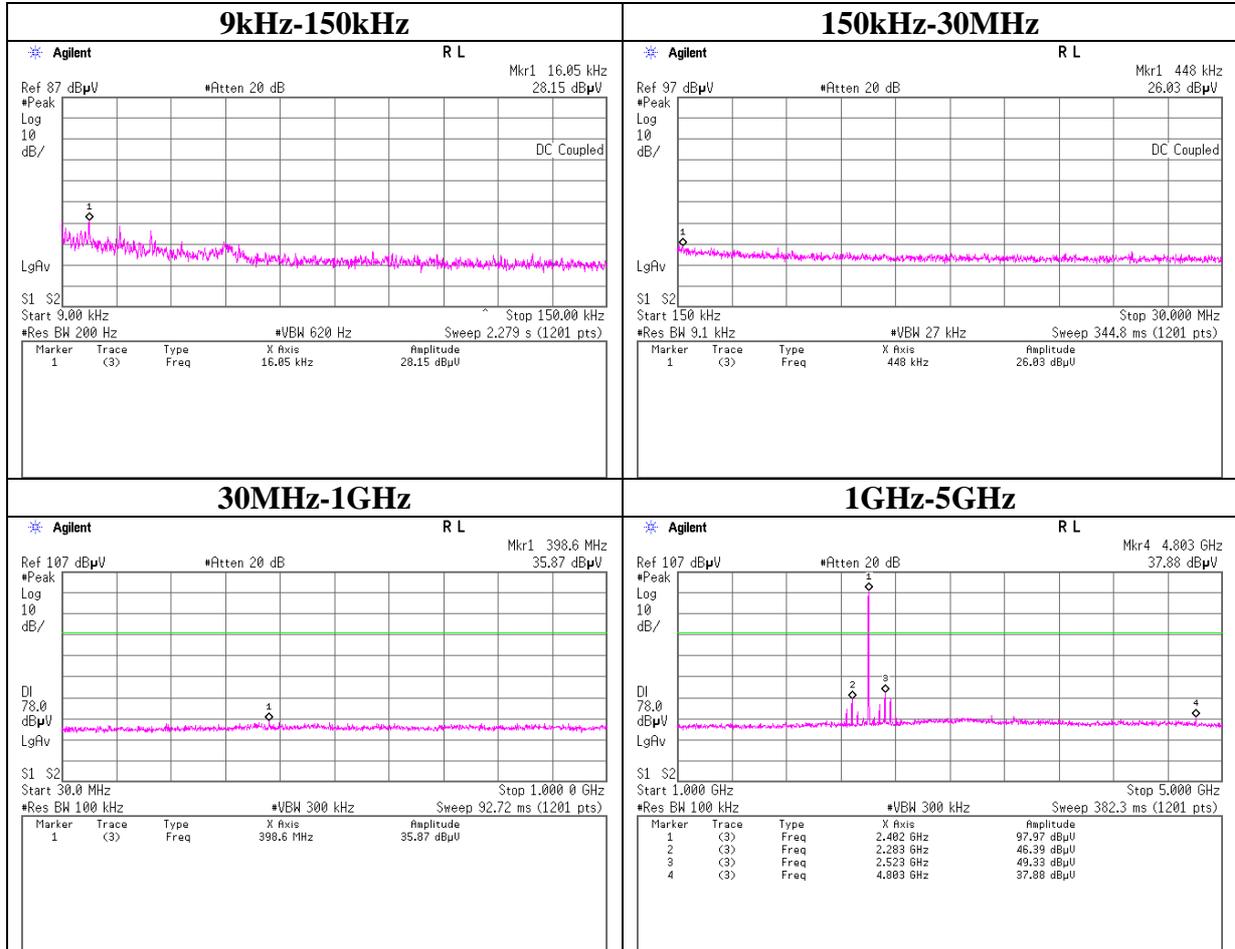
Conducted Spurious Emission

Tx DH5 2480MHz



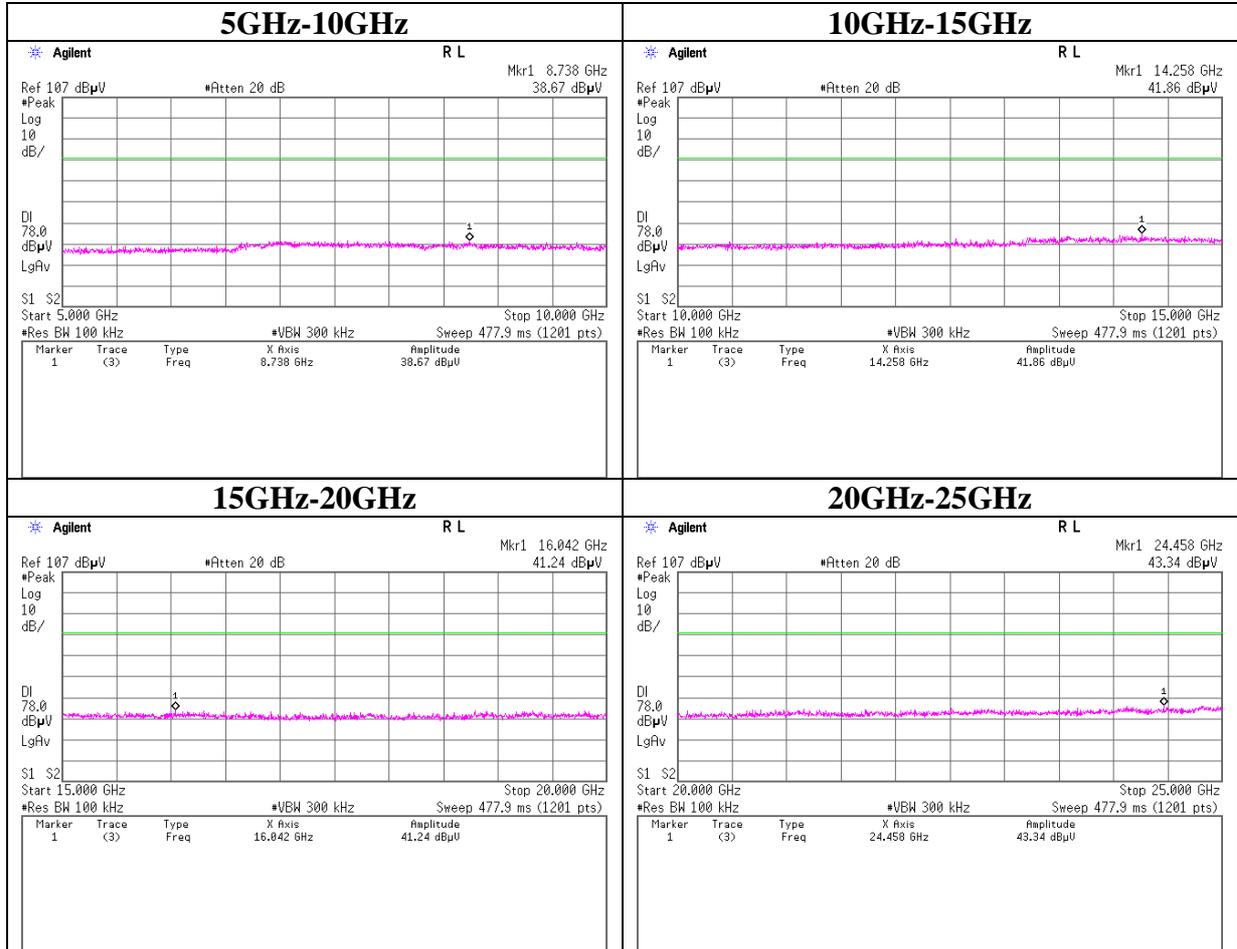
Conducted Spurious Emission

Tx 3DH5 2402MHz



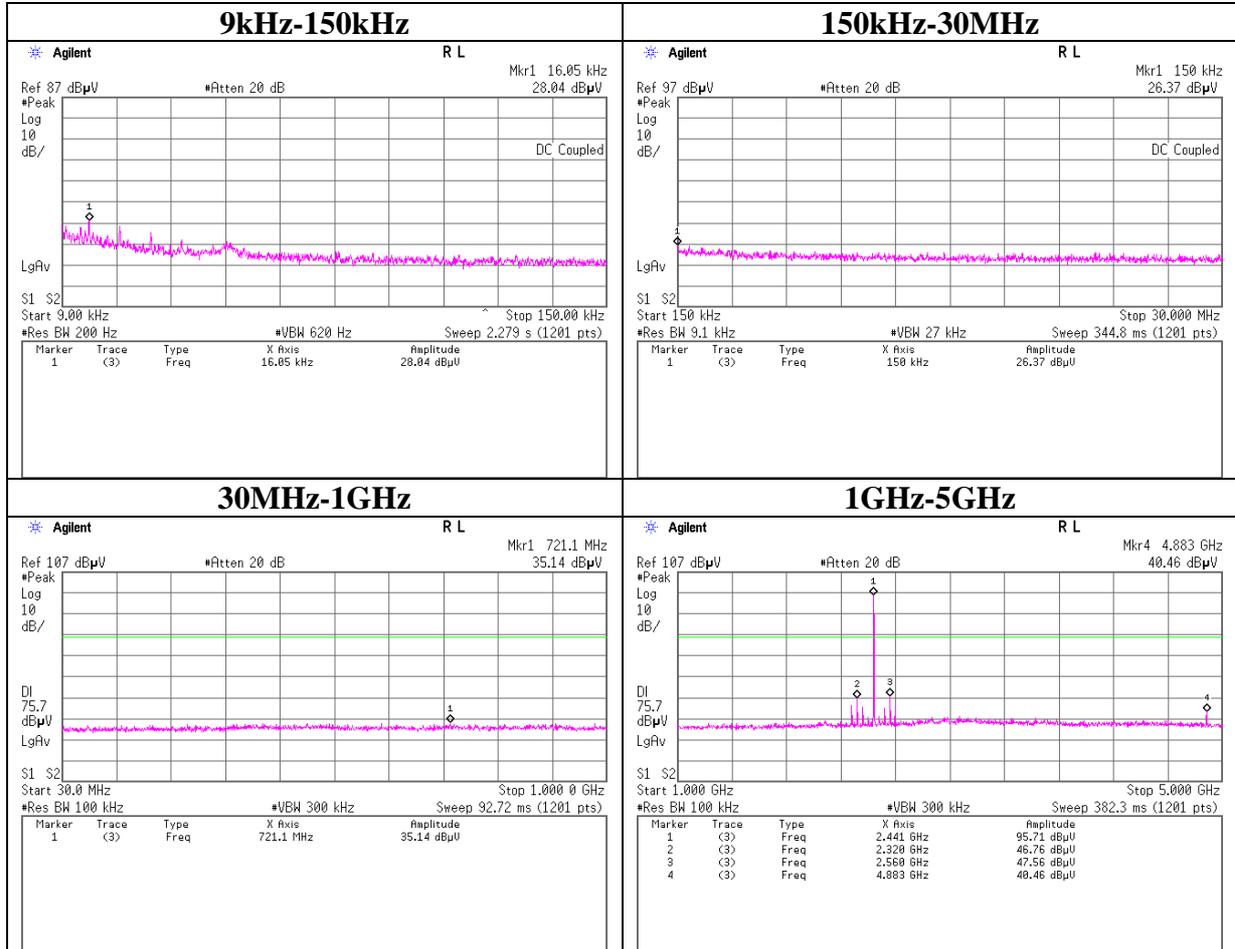
Conducted Spurious Emission

Tx 3DH5 2402MHz



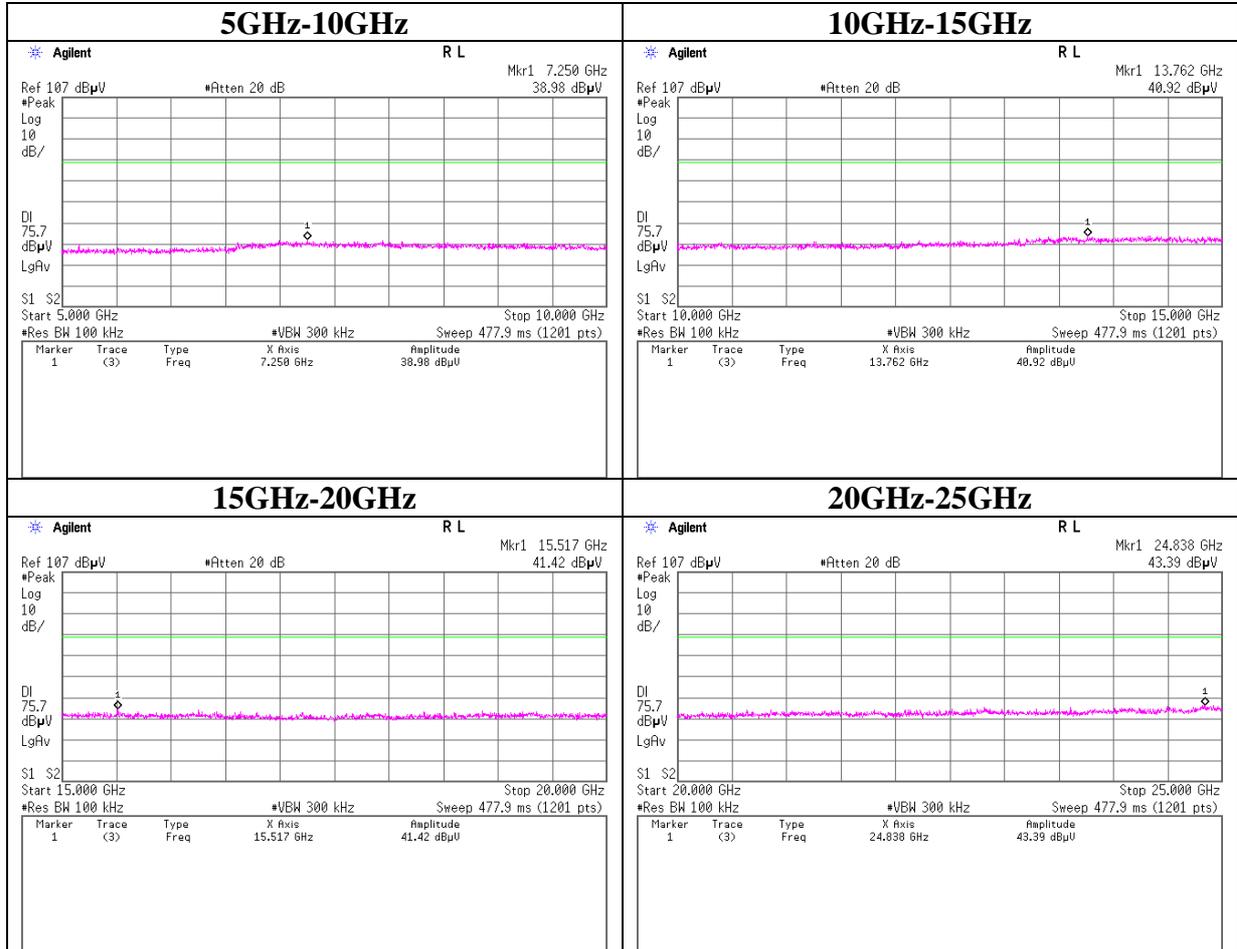
Conducted Spurious Emission

Tx 3DH5 2441MHz



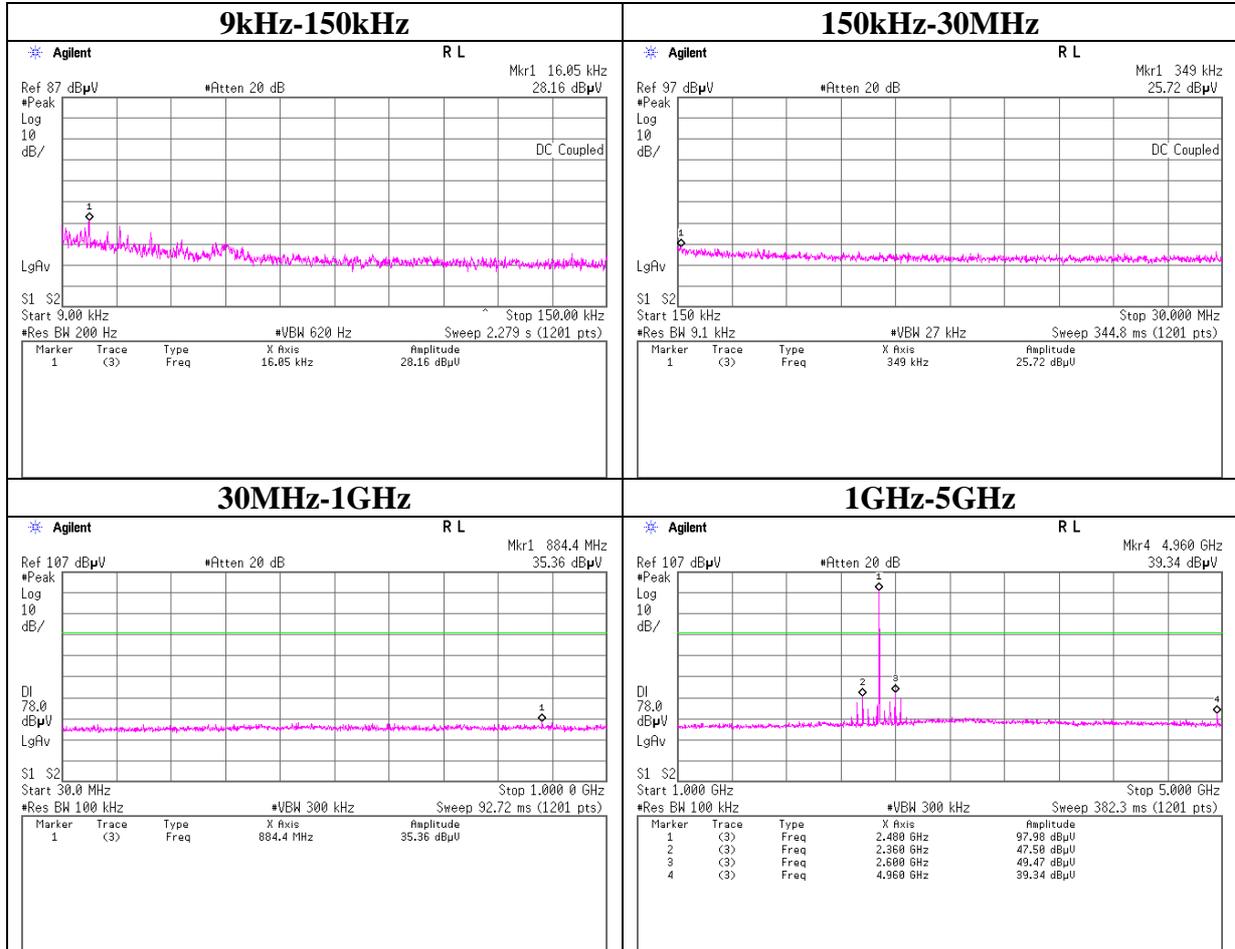
Conducted Spurious Emission

Tx 3DH5 2441MHz



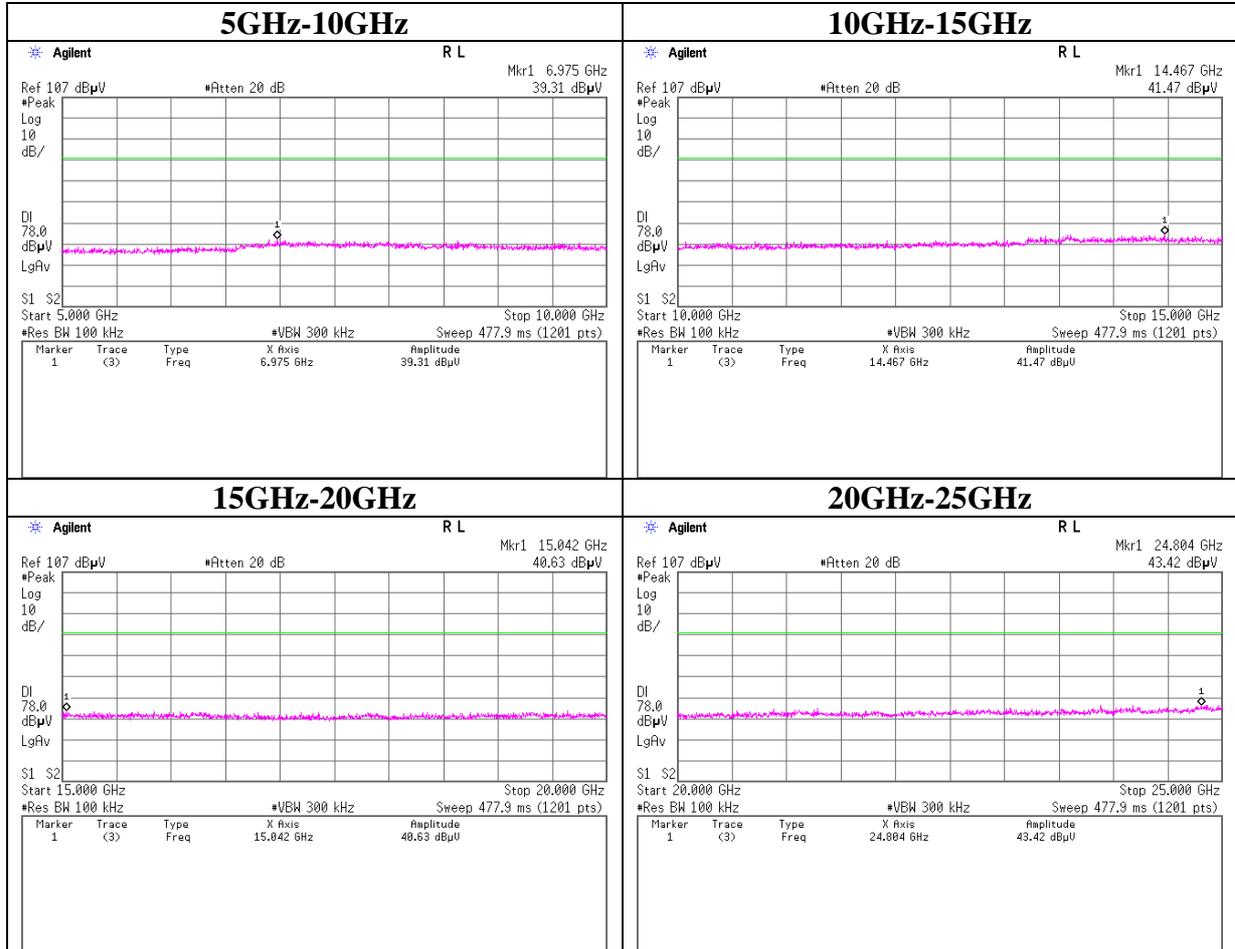
Conducted Spurious Emission

Tx 3DH5 2480MHz



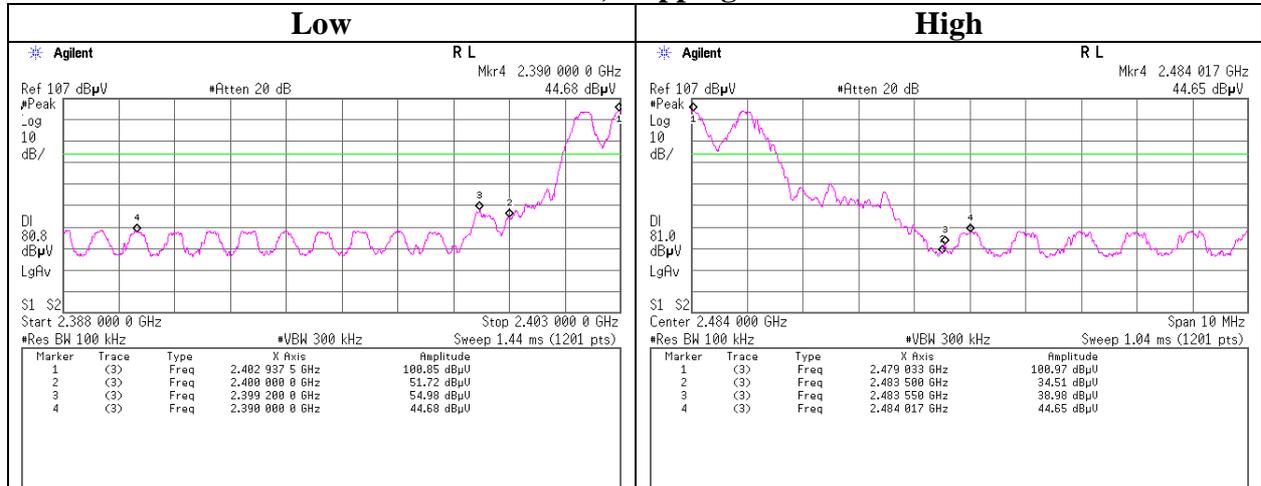
Conducted Spurious Emission

Tx 3DH5 2480MHz

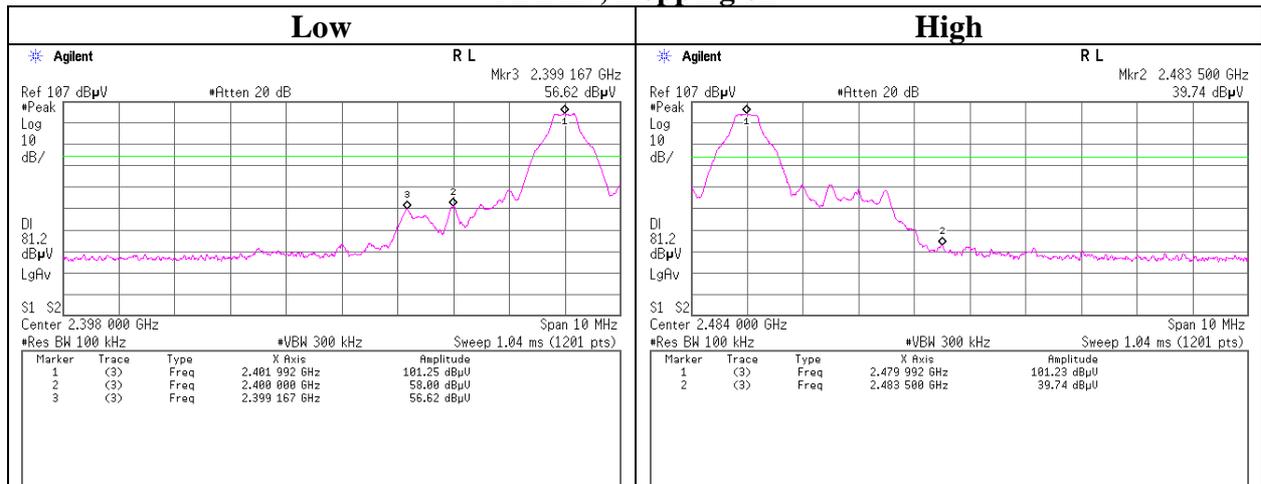


Conducted Emission Band Edge compliance

Tx DH5, Hopping on

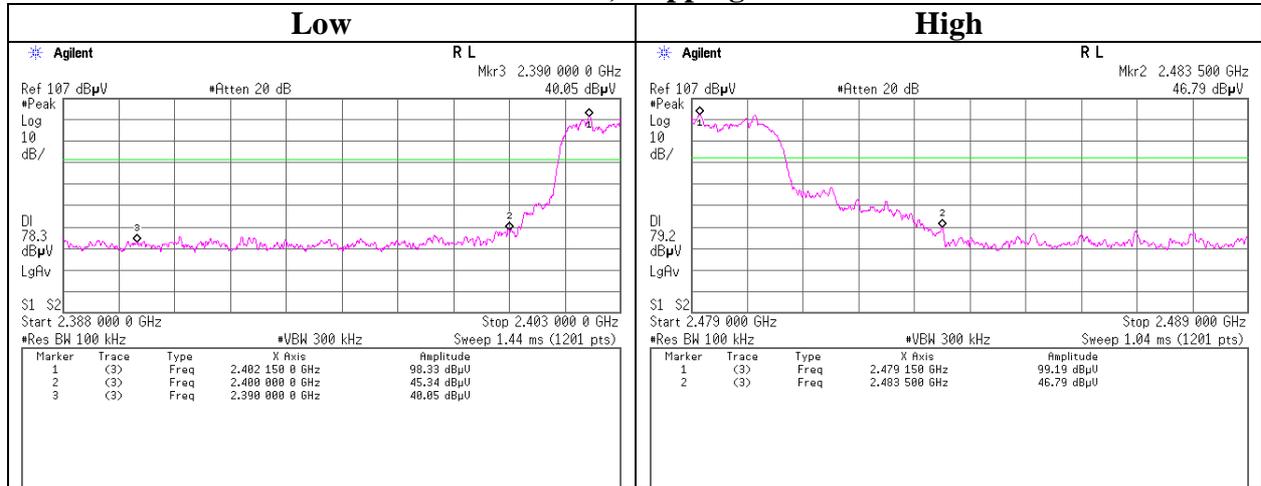


Tx DH5, Hopping off

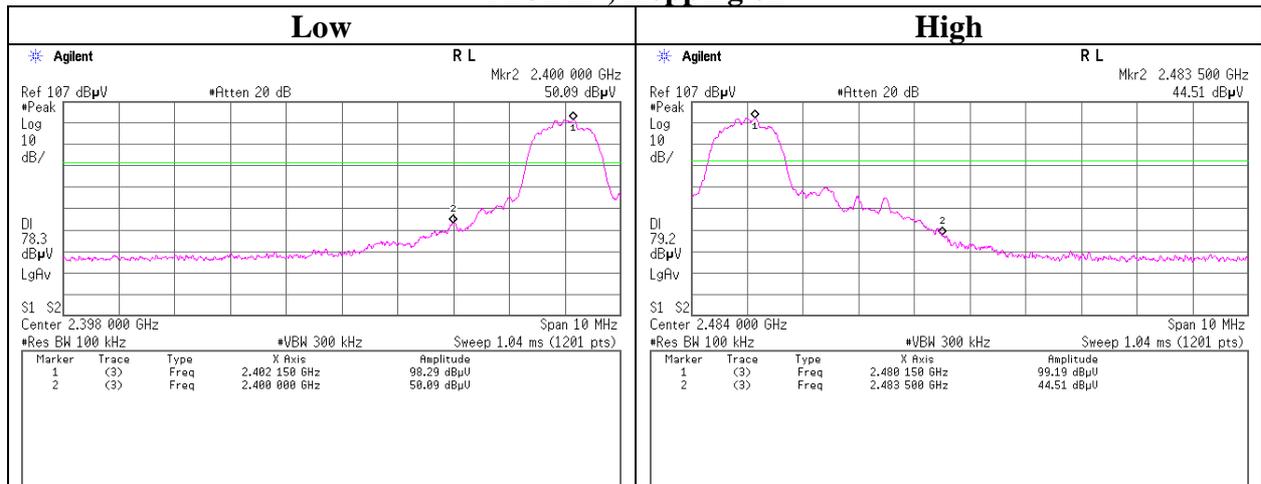


Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on



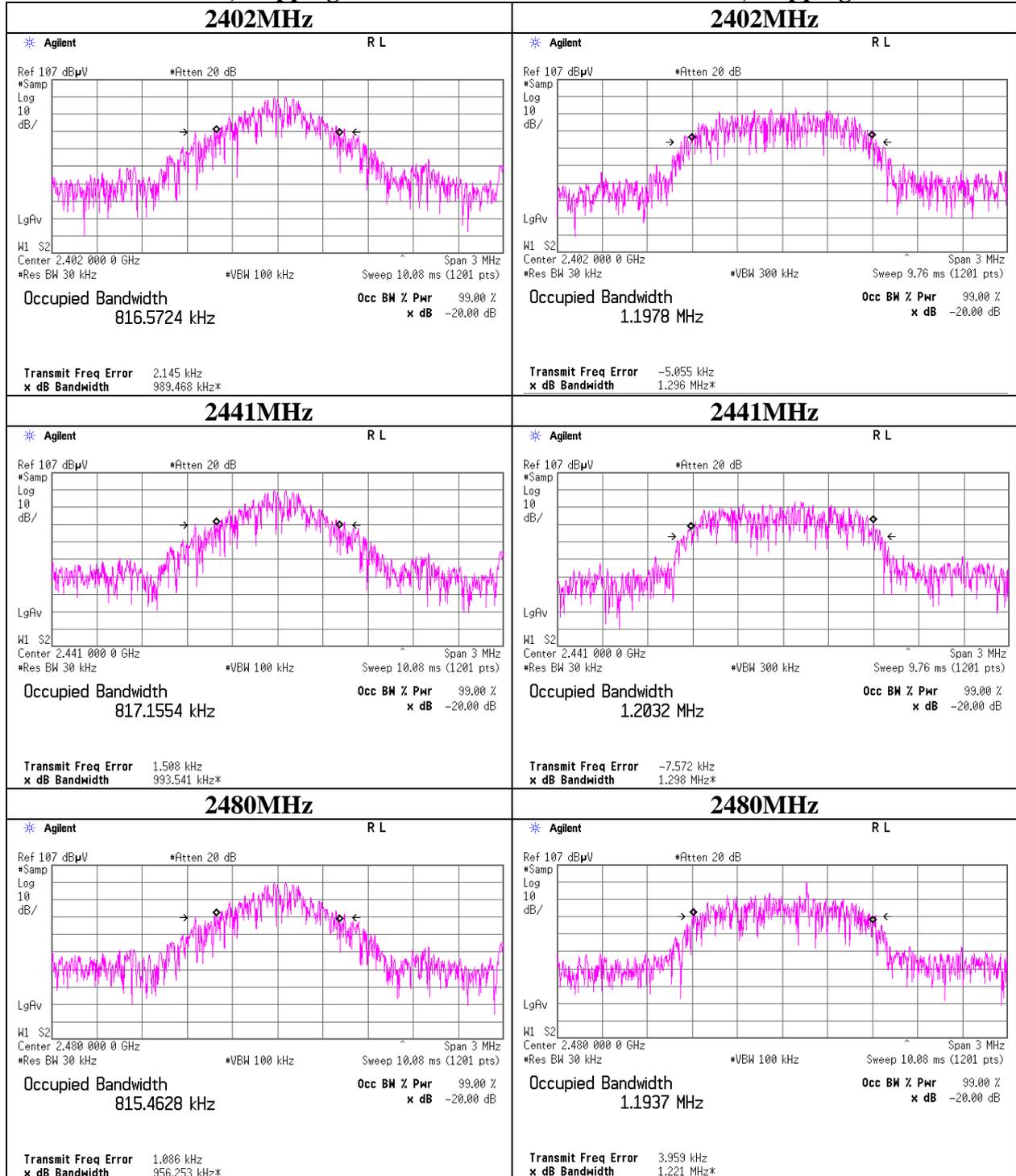
Tx 3DH5, Hopping off



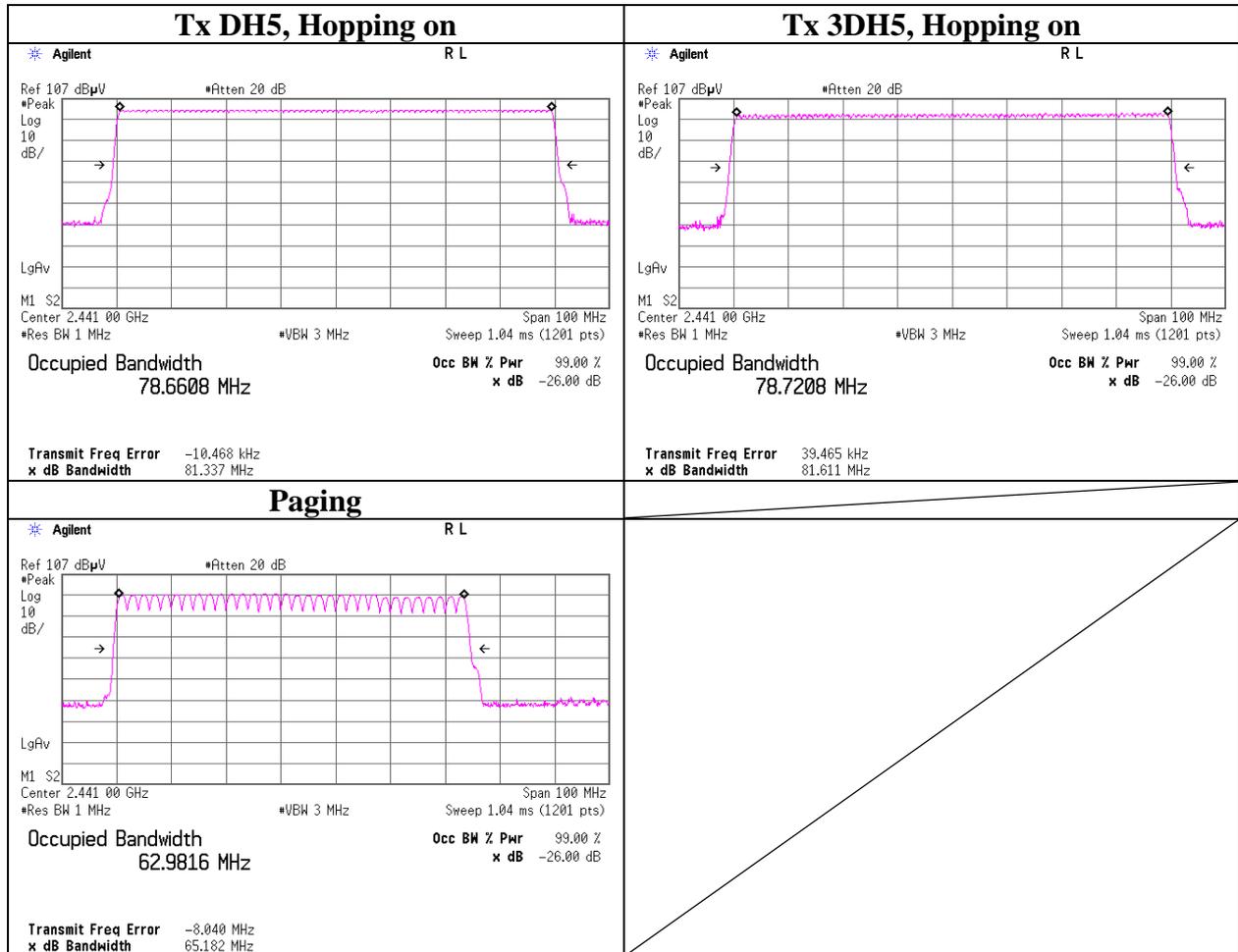
99%Occupied Bandwidth

Tx DH5, Hopping off

Tx 3DH5, Hopping off



99% Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2012/06/29 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2012/04/06 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2012/01/25 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2012/02/22 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2011/09/06 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2012/04/03 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2011/10/23 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2011/10/23 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2011/11/02 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2011/09/26 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	CE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	CE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2011/11/23 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	CE	2011/08/11 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NLSK8127	8127364	CE(EUT)	2012/02/09 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2012/07/12 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2012/02/06 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2011/09/12 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2011/09/12 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2012/03/27 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2011/10/28 * 12
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	AT	2012/06/19 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2011/10/28 * 12
MAT-24	Attenuator(10dB)(above 1 GHz)	Agilent	8493C	71389	AT	2012/06/27 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2011/09/13 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2011/09/13 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2011/12/09 * 12

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test