



Test report No. : 32IE0103-HO-01-A-R1
Page : 1 of 54
Issued date : July 4, 2012
Revised date : July 12, 2012
FCC ID : A7RM115A

RADIO TEST REPORT

Test Report No. : 32IE0103-HO-01-A-R1

Applicant : Orion Electric Co., Ltd.
Type of Equipment : BLUETOOTH MODULE
Model No. : OBT-01
FCC ID : A7RM115A
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 32IE0103-HO-01-A. 32IE0103-HO-01-A is replaced with this report.

Date of test: June 18 and 24, 2012

Representative test engineer:


Takeshi Choda
Engineer of WiSE Japan,
UL Verification Service

Approved by:


Masanori Nishiyama
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.....	4
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: Conducted Emission.....	10
SECTION 6: Radiated Spurious Emission	11
SECTION 7: Antenna Terminal Conducted Tests.....	13
APPENDIX 1: Data of EMI test.....	15
Conducted Emission	15
20dB Bandwidth and Carrier Frequency Separation.....	19
Number of Hopping Frequency	22
Dwell time.....	24
Maximum Peak Output Power	27
Radiated Spurious Emission	28
Conducted Spurious Emission	35
Conducted Emission Band Edge compliance	47
99%Occupied Bandwidth	49
APPENDIX 2: Test instruments	51
APPENDIX 3: Photographs of test setup	53
Conducted Emission	53
Radiated Spurious Emission	54

SECTION 1: Customer information

Company Name	:	Orion Electric Co Ltd.
Address	:	41-1 Iehisa-cho Echizen-city, Fukui-Pref 915-8555 Japan
Telephone Number	:	+81-778-23-0001
Facsimile Number	:	+81-778-23-7799
Contact Person	:	Shigeto Yamada

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

2.1 Identification of E.U.T.

Type of Equipment	:	BLUETOOTH MODULE
Model No.	:	OBT-01
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.3V (AC120V/60Hz (Host))
Receipt Date of Sample	:	June 15, 2012
Country of Mass-production	:	Thailand
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

Radio Specification

[Bluetooth (Ver. 2.0 with EDR function)]

Radio Type	:	Transceiver
Frequency of Operation	:	2402-2480MHz
Modulation	:	FHSS
Power Supply (radio part input)	:	DC 3.3V
Antenna type	:	Inverted F Antenna
Antenna Gain	:	-3.0dBi

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 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 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

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 10.0dB, 11.60113MHz, N AV 6.9dB, 0.40040MHz, N	Complied	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section 15.247(a)(1) IC: RSS-210 A8.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section 15.247(a)(1) IC: RSS-210 A8.1 (a)		-	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section 15.247(a)(1)(iii) IC: RSS-210 A8.1 (d)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section 15.247(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: Section 15.247(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: Section 15.247(d) IC: RSS-210 A8.5 RSS-Gen 6 and 7.2.3	4.5dB 1601.971MHz, AV, Vertical	Complied	Conducted/ Radiated

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)

The stable voltage (DC3.3V) is constantly provided with the EUT through the regulator installed in the end product. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 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.

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

3.3 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						
	(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	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	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.

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Carrier Frequency Separation	Tx (Hopping on) DH5, 3DH5	2402MHz 2441MHz 2480MHz
20dB Bandwidth	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Number of Hopping Frequency	Tx (Hopping on) DH5, 3DH5	-
Dwell time	Tx (Hopping on), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5	-
Maximum Peak Output Power	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping on -Hopping off	2402MHz 2480MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -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 length (except Dwell time test) *EUT has the power settings by the software as follows; Power settings: BDR: Ext. = 255, Int. = 46 EDR: Ext. = 255, Int. = 48 Software: CSR BlueSuite BlueTest3 Version2.3 *This setting of software is the worst case. 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.		

UL Japan, Inc.

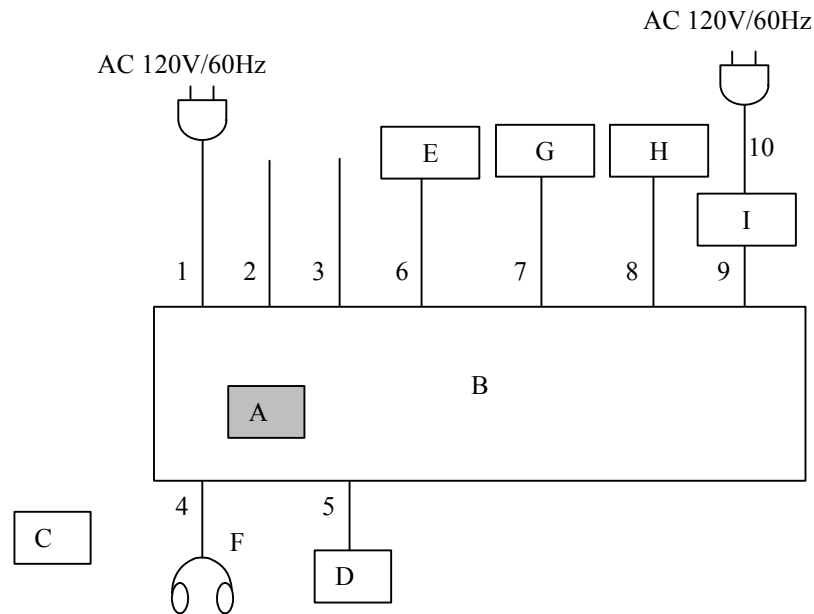
Head Office EMC Lab.

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(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	BLUETOOTH MODULE	OBT-01	OR-0472	Orion Electric Co Ltd	EUT
B	CD Receiver	CR-245BT	OR-0472	ONKYO	-
C	Remote control	RC-854C	-	ONKYO	-
D	USB Memory	PD07-WH4GB	C090000000014303	KINGMAX	-
E	CD Player	SL-CT520	WL7GA002317R	Panasonic	-
F	Head Phone	LT-100	-	Panasonic	-
G	Speaker	DT-05	-	ONKYO	-
H	Speaker	DT-05	-	ONKYO	-
I	Sub Woofer	SW-P201	Z059330QS	YAMAHA	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	AC Cable	1.5	Unshielded	Unshielded	-
2	AM Antenna Cable	1.2	Unshielded	Unshielded	-
3	FM Antenna Cable	1.5	Unshielded	Unshielded	-
4	Headphone Cable	3.0	Unshielded	Unshielded	-
5	USB Cable	3.0	Shielded	Shielded	-
6	Audio Cable	2.0	Unshielded	Unshielded	-
7	Speaker Cable	1.1	Unshielded	Unshielded	-
8	Speaker Cable	1.1	Unshielded	Unshielded	-
9	Audio Cable	1.1	Shielded	Shielded	-
10	AC Cable	1.8	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 1.5m, 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.

Frequency : From 9kHz to 150kHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0deg., 45deg., 90deg., and 135 deg.) and horizontal polarization.

*Refer to Figure 1 about Direction of the Loop Antenna.

	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz
Detector Type	PK	QP
IF Bandwidth	200Hz	200Hz

Test Antennas are used as below;

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

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

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

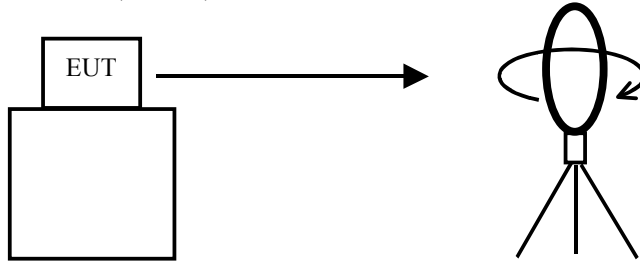
The test was made on EUT at the normal use position.

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

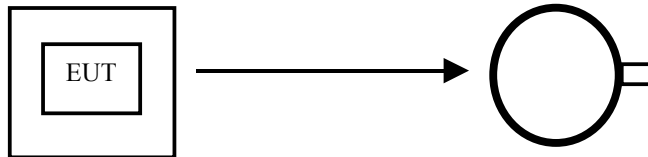
Measurement range	: 9kHz-26.5GHz
Test data	: APPENDIX
Test result	: Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

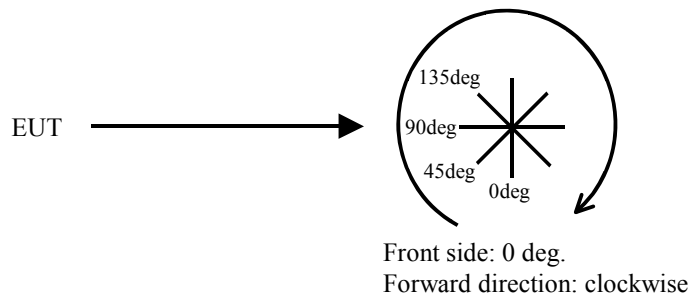


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



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	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	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3MHz	30kHz	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				

*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).

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

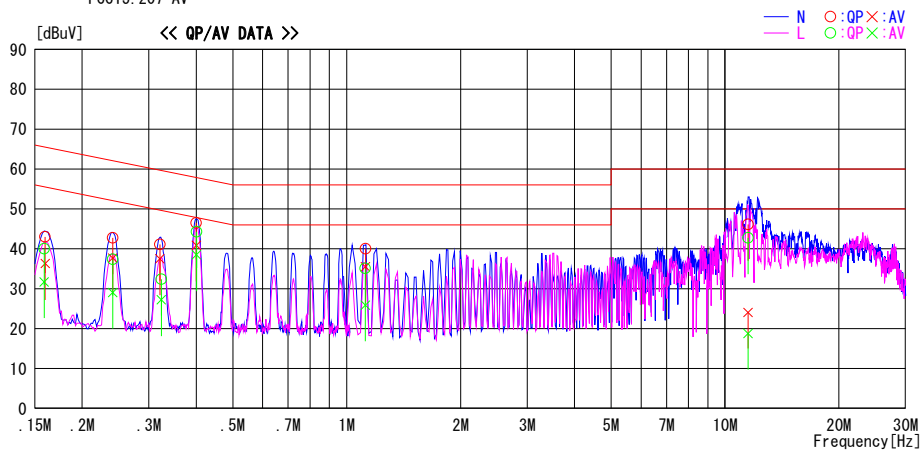
UL Japan, Inc. Head Office EMC Lab. No. 3 Semi Anechoic Chamber
Date : 2012/06/24

Report No. : 321E0103-H0-01

Temp./Humi. : 22deg. C / 59% RH
Engineer : Takumi Shimada

Mode / Remarks : BT Tx DH5 2441MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

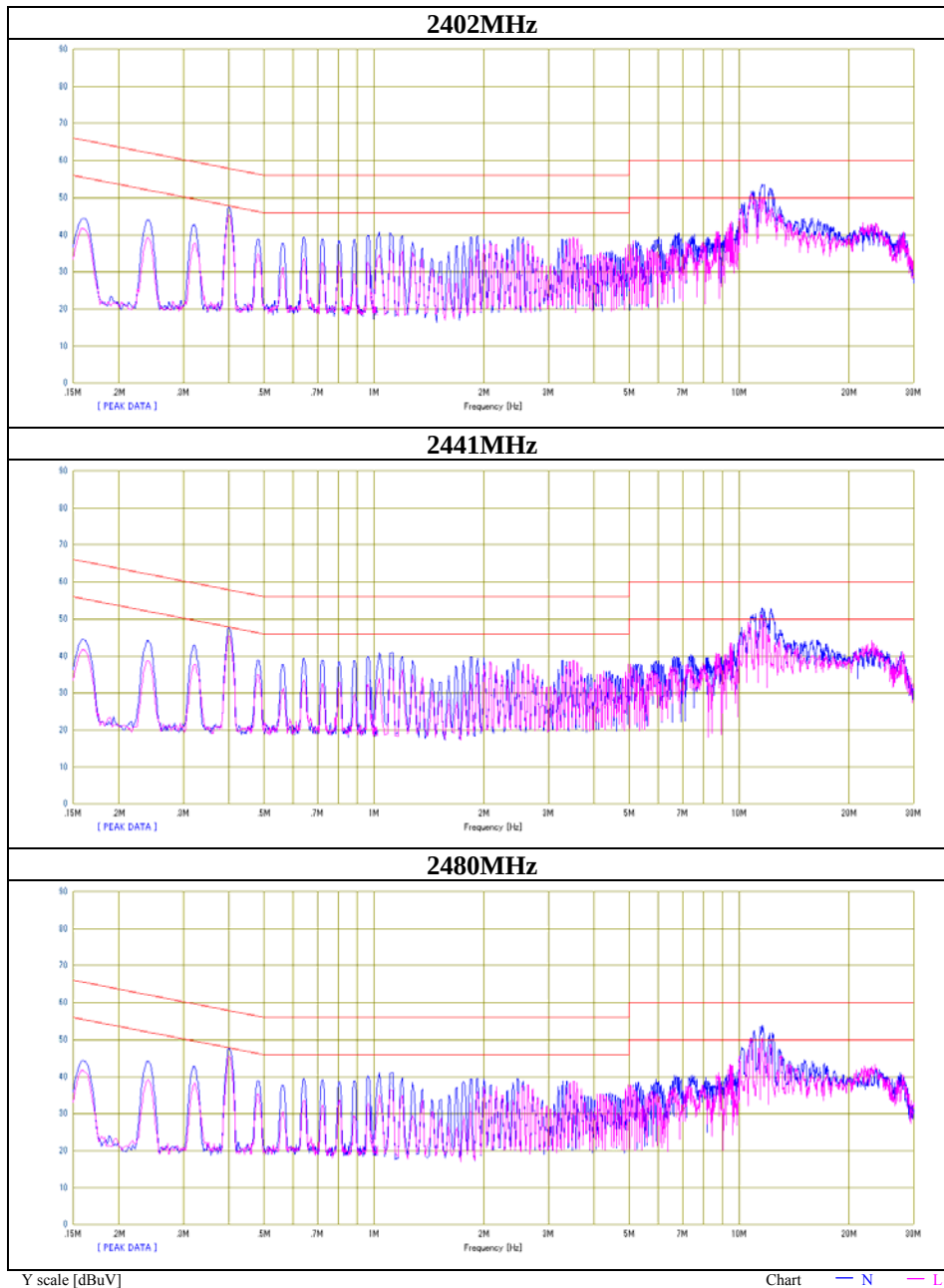


Frequency [MHz]	Reading		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15956	29.8	23.1	13.2	43.0	36.3	65.5	55.5	22.5	19.2	N	
0.24082	29.4	24.4	13.3	42.7	37.7	62.1	52.1	19.4	14.4	N	
0.32078	27.8	24.2	13.3	41.1	37.5	59.7	49.7	18.6	12.2	N	
0.40040	33.2	27.6	13.3	46.5	40.9	57.8	47.8	11.3	6.9	N	
1.12164	26.7	22.2	13.3	40.0	35.5	56.0	46.0	16.0	10.5	N	
11.50744	32.0	10.0	14.1	46.1	24.1	60.0	50.0	13.9	25.9	N	
0.15872	26.8	18.5	13.2	40.0	31.7	65.5	55.5	25.5	23.8	L	
0.24074	24.1	15.8	13.3	37.4	29.1	62.1	52.1	24.7	23.0	L	
0.32386	19.1	13.9	13.3	32.4	27.2	59.6	49.6	27.2	22.4	L	
0.40112	31.0	25.2	13.3	44.3	38.5	57.8	47.8	13.5	9.3	L	
1.12045	21.8	12.6	13.3	35.1	25.9	56.0	46.0	20.9	20.1	L	
11.50144	28.6	4.7	14.1	42.7	18.8	60.0	50.0	17.3	31.2	L	

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

Conducted Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32IE0103-HO-01
Date	06/24/2012
Temperature/ Humidity	22 deg. C/ 59% RH
Engineer	Takumi Shimada
Mode	Tx DH5



Conducted Emission

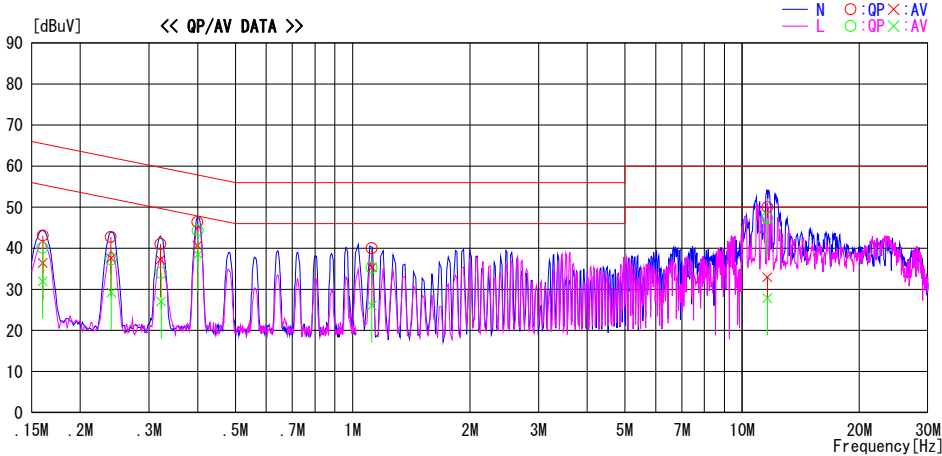
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2012/06/24

Report No. : 32IE0103-H0-01
Temp./Humi. : 22deg. C / 59% RH
Engineer : Takumi Shimada

Mode / Remarks : BT Tx 3DH5 2441MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

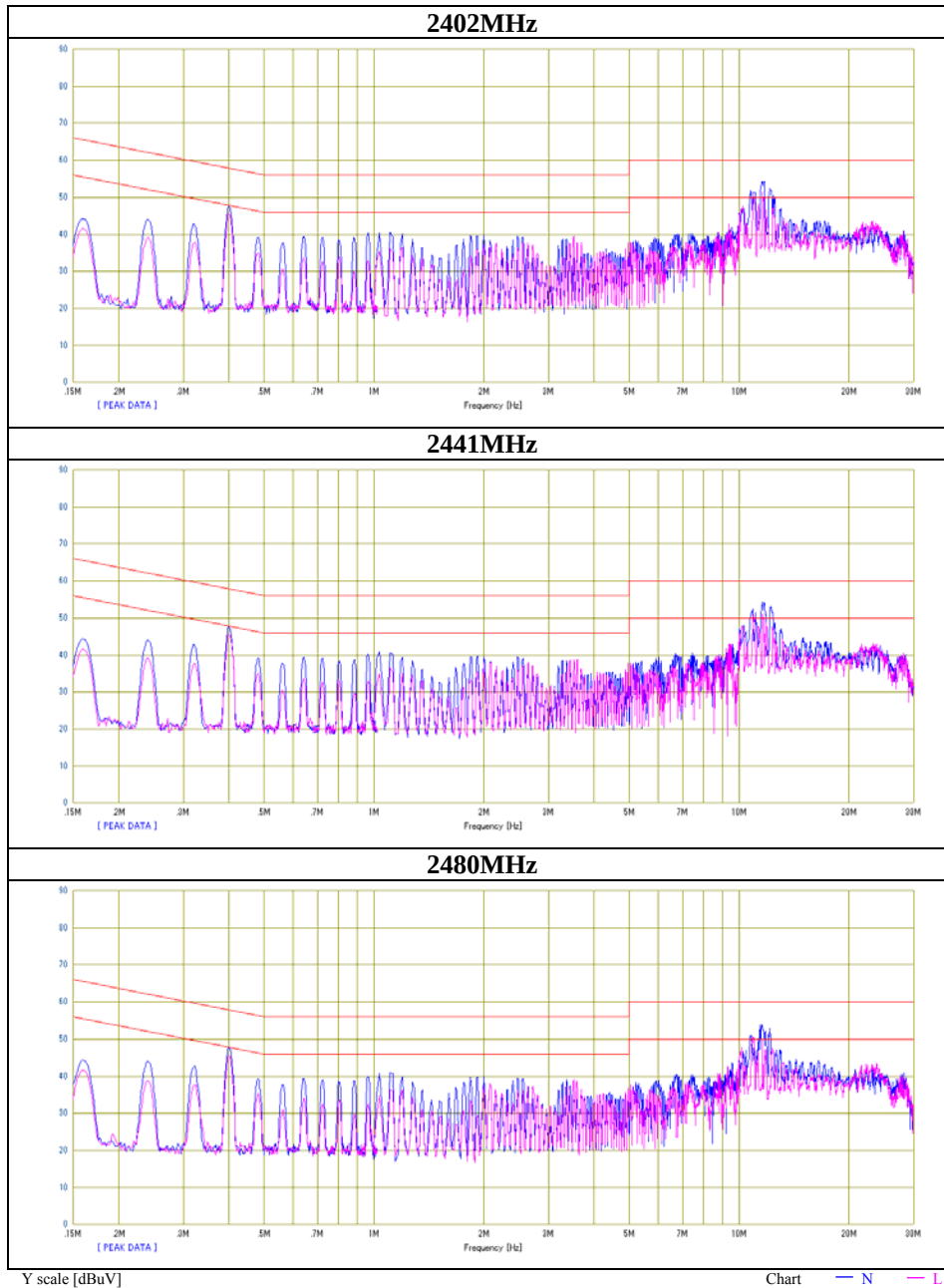


Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV		QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.16016	29.9	23.2	13.2	43.1	36.4	65.5	55.5	22.4	19.1	N	
0.23960	29.4	24.3	13.3	42.7	37.6	62.1	52.1	19.4	14.5	N	
0.32092	27.7	23.9	13.3	41.0	37.2	59.7	49.7	18.7	12.5	N	
0.39946	33.1	27.4	13.3	46.4	40.7	57.9	47.9	11.5	7.2	N	
1.12005	26.7	22.0	13.3	40.0	35.3	56.0	46.0	16.0	10.7	N	
11.60113	35.8	18.8	14.2	50.0	33.0	60.0	50.0	10.0	17.0	N	
0.15995	26.9	18.8	13.2	40.1	32.0	65.5	55.5	25.4	23.5	L	
0.24008	24.0	15.9	13.3	37.3	29.2	62.1	52.1	24.8	22.9	L	
0.32223	20.7	13.8	13.3	34.0	27.1	59.6	49.6	25.6	22.5	L	
0.40054	31.0	25.2	13.3	44.3	38.5	57.8	47.8	13.5	9.3	L	
1.12007	22.0	12.8	13.3	35.3	26.1	56.0	46.0	20.7	19.9	L	
11.60151	33.2	13.7	14.2	47.4	27.9	60.0	50.0	12.6	22.1	L	

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

Conducted Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32IE0103-HO-01
Date	06/24/2012
Temperature/ Humidity	22 deg. C/ 59% RH
Engineer	Takumi Shimada
Mode	Tx 3DH5



20dB Bandwidth and Carrier Frequency Separation

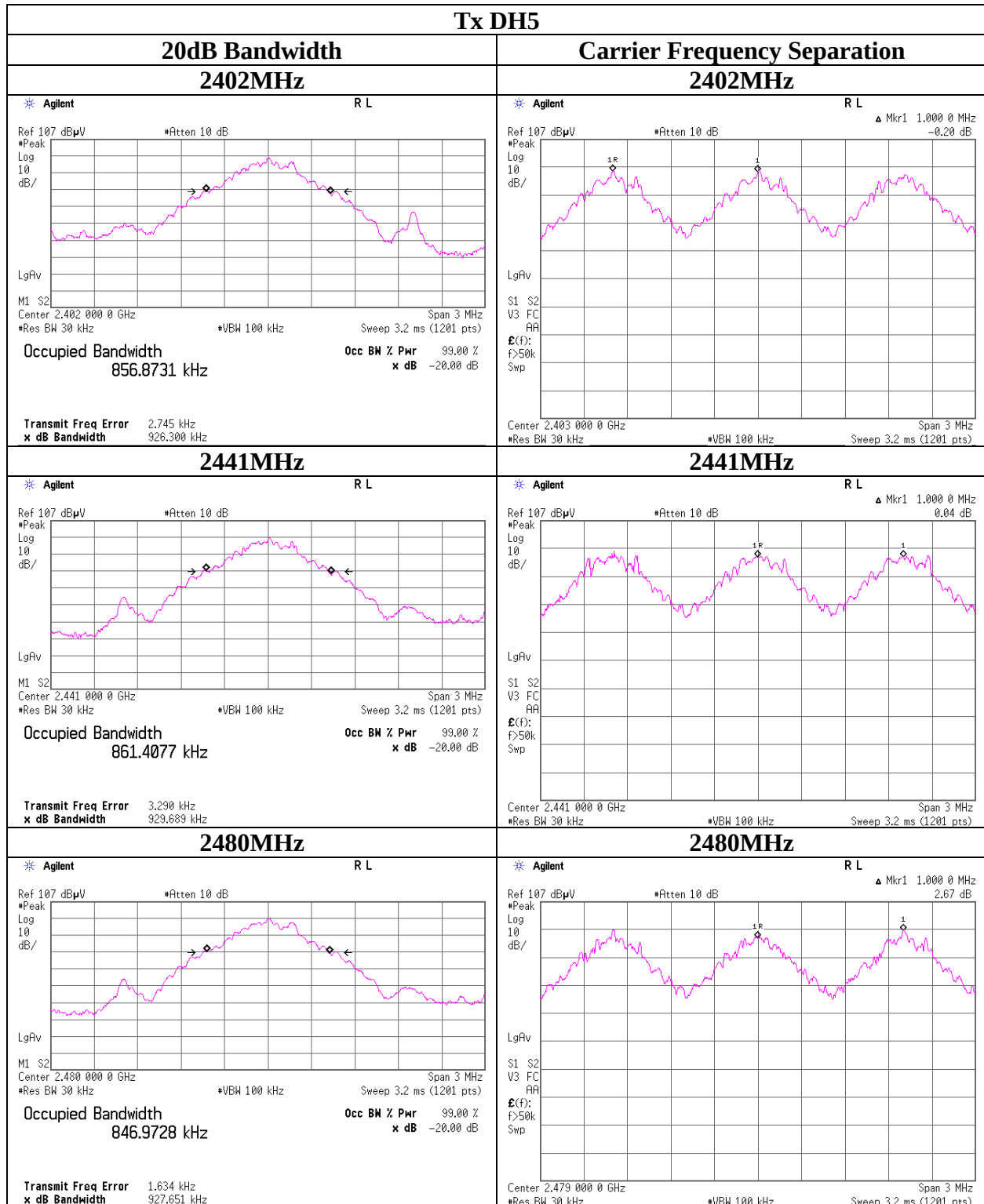
Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32IE0103-HO-01
Date 06/18/2012
Temperature/ Humidity 22 deg.C/ 57% RH
Engineer Takeshi Choda
Mode Tx (Hopping on) DH5/3DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.926	1.000	≥ 0.618
DH5	2441.0	0.930	1.000	≥ 0.620
DH5	2480.0	0.928	1.000	≥ 0.618
3DH5	2402.0	1.293	1.000	≥ 0.862
3DH5	2441.0	1.305	1.000	≥ 0.870
3DH5	2480.0	1.273	1.000	≥ 0.849

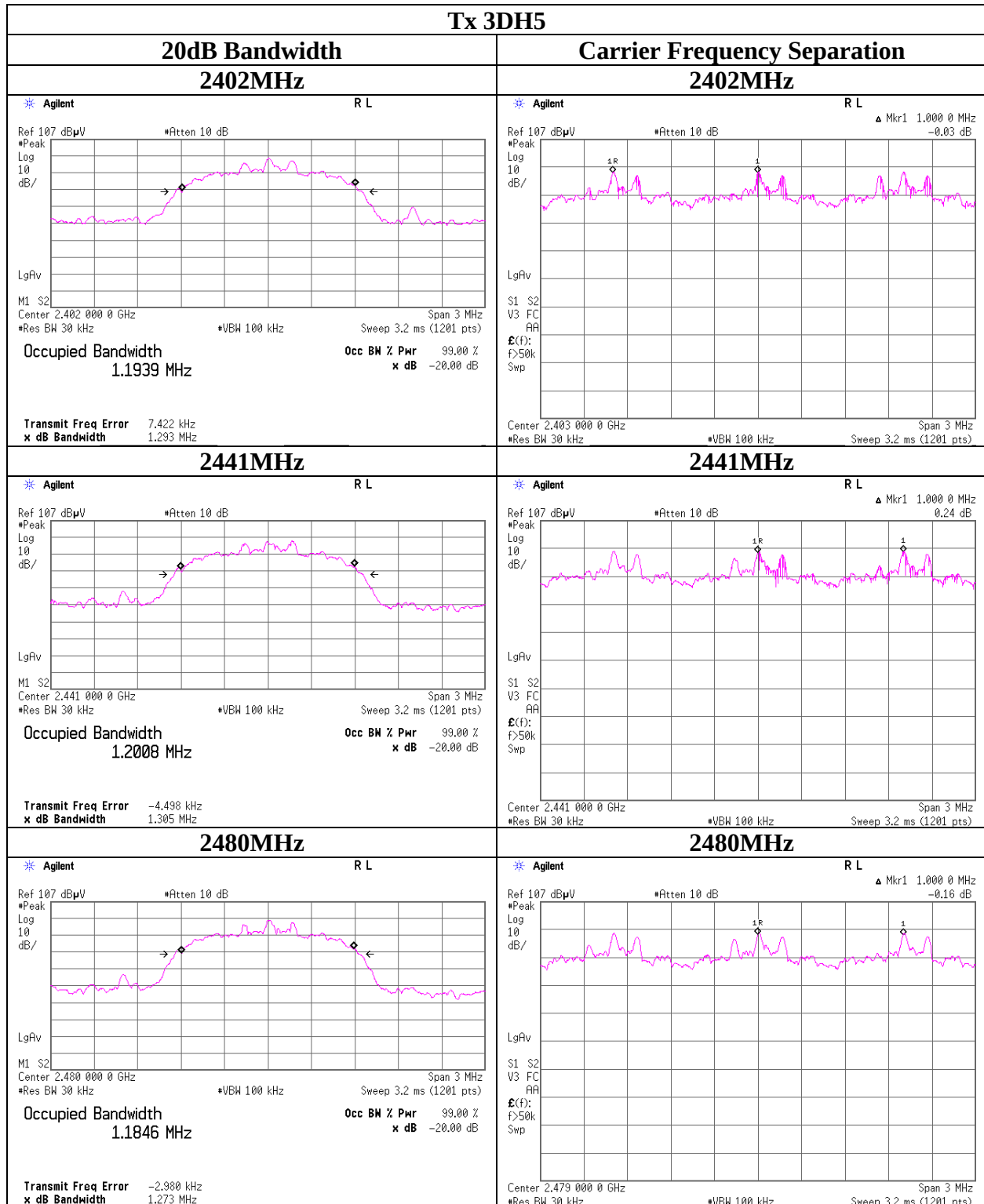
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

No limit applies to 20dB Bandwidth.

20dB Bandwidth and Carrier Frequency Separation



20dB Bandwidth and Carrier Frequency Separation



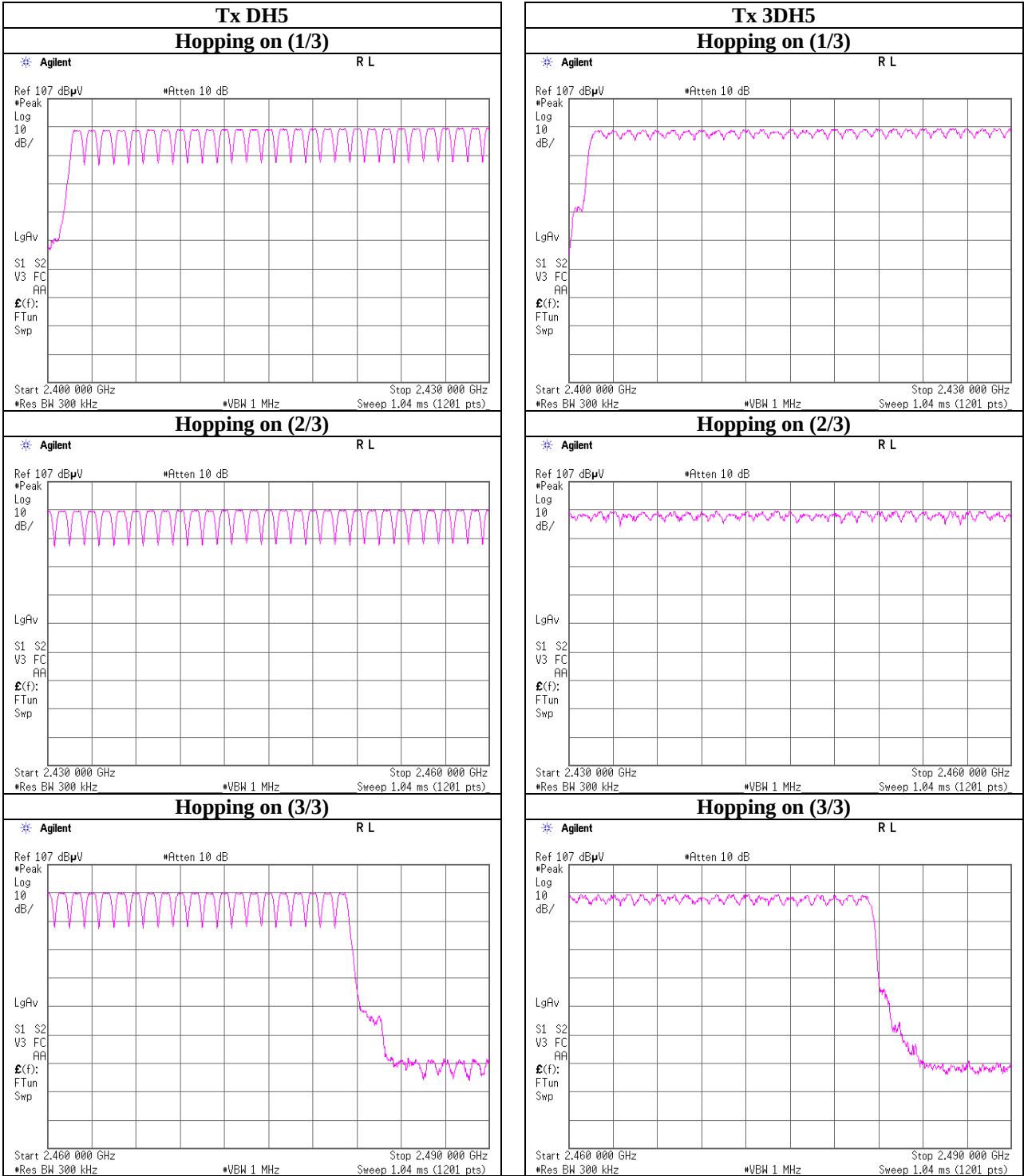
Number of Hopping Frequency

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32IE0103-HO-01
Date 06/18/2012
Temperature/ Humidity 22 deg.C/ 57% RH
Engineer Takeshi Choda
Mode Tx (Hopping on) DH5/3DH5

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

Number of Hopping Frequency



Dwell time

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 32IE0103-HO-01
Date 06/18/2012 06/18/2012
Temperature/ Humidity 22 deg.C/ 57% RH 22 deg.C/ 57% RH
Engineer Takeshi Choda Takeshi Choda
Mode Tx (Hopping on) DH5/3DH5

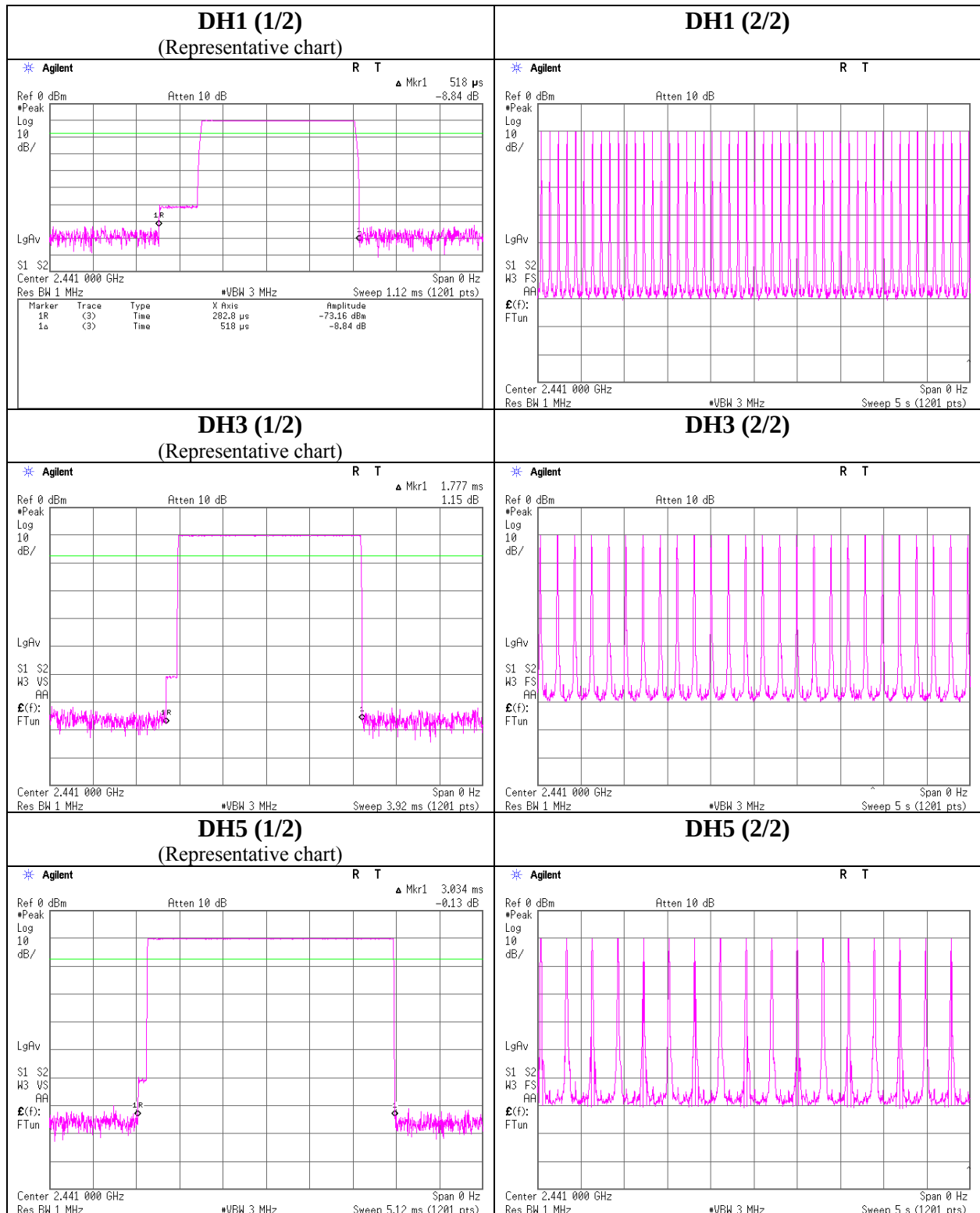
Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period				Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	51.0 times	/	5 sec.	x 31.6 sec. = 323 times	0.518	167	400
DH3	26.0 times	/	5 sec.	x 31.6 sec. = 165 times	1.777	293	400
DH5	17.0 times	/	5 sec.	x 31.6 sec. = 108 times	3.034	328	400
3DH1	51.0 times	/	5 sec.	x 31.6 sec. = 323 times	0.532	172	400
3DH3	26.0 times	/	5 sec.	x 31.6 sec. = 165 times	1.786	295	400
3DH5	17.0 times	/	5 sec.	x 31.6 sec. = 108 times	3.042	329	400

Sample Calculation

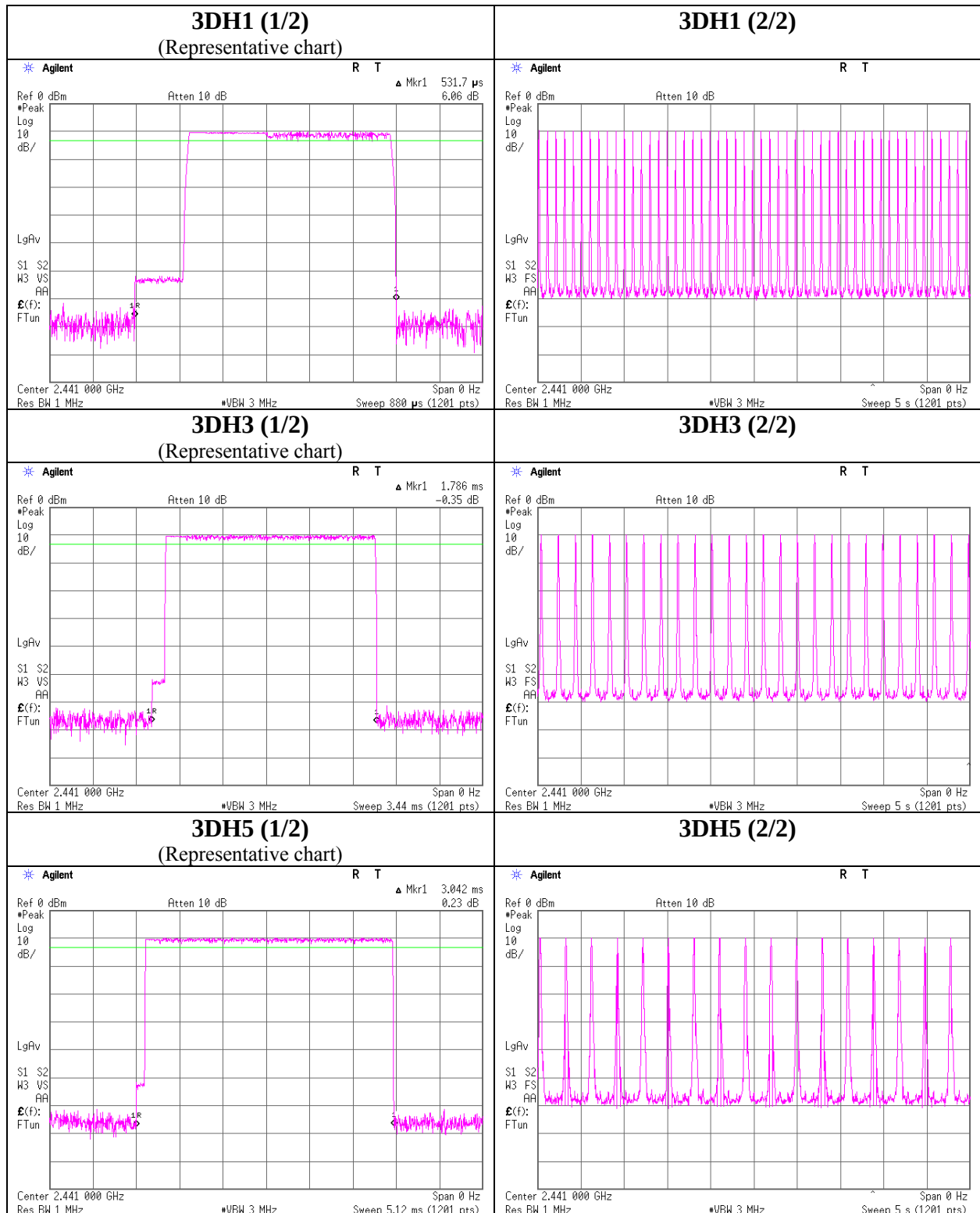
Result = Number of transmission x Length of transmittion time

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. 32IE0103-HO-01
Date 06/18/2012
Temperature/ Humidity 22 deg.C/ 57% RH
Engineer Takeshi Choda
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	-10.92	1.33	10.08	0.49	1.12	20.96	125	20.47
DH5	2441.0	-10.06	1.34	10.08	1.36	1.37	20.96	125	19.60
DH5	2480.0	-10.04	1.34	10.09	1.39	1.38	20.96	125	19.57
3DH5	2402.0	-10.32	1.33	10.08	1.09	1.29	20.96	125	19.87
3DH5	2441.0	-9.55	1.34	10.08	1.87	1.54	20.96	125	19.09
3DH5	2480.0	-9.74	1.34	10.09	1.69	1.48	20.96	125	19.27

Sample Calculation:

Result = Reading + Cable Loss + 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.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. 32IE0103-HO-01
Date 06/22/2012 06/24/2012
Temperature/ Humidity 23 deg.C/ 68% RH 22 deg.C/ 59% RH
Engineer Tomohisa Nakagawa Takumi Shimada
Below 1GHz Above 1GHz
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	98.302	QP	37.2	9.3	7.5	28.4	25.6	43.5	17.9	
Hori	122.878	QP	28.8	12.9	7.7	28.3	21.1	43.5	22.4	
Hori	256.497	QP	36.8	17.6	8.6	27.6	35.4	46.0	10.6	
Hori	344.058	QP	33.2	15.8	9.1	27.9	30.2	46.0	15.8	
Hori	512.993	QP	31.1	18.5	9.8	28.8	30.6	46.0	15.4	
Hori	769.492	QP	28.6	21.7	10.8	28.2	32.9	46.0	13.1	
Hori	1601.999	PK	50.4	25.4	1.8	33.4	44.2	73.9	29.7	
Hori	2390.000	PK	42.3	27.4	2.2	32.4	39.5	73.9	34.4	
Hori	4804.000	PK	50.7	31.6	4.0	31.4	54.9	73.9	19.0	
Hori	1601.999	AV	45.5	25.4	1.8	33.4	39.3	53.9	14.6	
Hori	2390.000	AV	29.9	27.4	2.2	32.4	27.1	53.9	26.8	
Vert	37.782	QP	34.0	15.1	6.8	28.6	27.3	40.0	12.7	
Vert	128.247	QP	36.7	13.3	7.7	28.2	29.5	43.5	14.0	
Vert	160.186	QP	36.5	15.4	7.9	28.1	31.7	43.5	11.8	
Vert	257.497	QP	33.8	17.6	8.6	27.6	32.4	46.0	13.6	
Vert	512.993	QP	32.8	18.5	9.8	28.8	32.3	46.0	13.7	
Vert	769.492	QP	27.4	21.7	10.8	28.2	31.7	46.0	14.3	
Vert	1602.013	PK	56.1	25.4	1.8	33.4	49.9	73.9	24.0	
Vert	2390.000	PK	42.8	27.4	2.2	32.4	40.0	73.9	33.9	
Vert	4804.000	PK	55.7	31.6	4.0	31.4	59.9	73.9	14.0	
Vert	1602.013	AV	54.4	25.4	1.8	33.4	48.2	53.9	5.7	
Vert	2390.000	AV	30.1	27.4	2.2	32.4	27.3	53.9	26.6	

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).

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

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	85.3	27.4	2.2	32.4	82.5	-	-	Carrier
Hori	2400.000	PK	46.0	27.4	2.2	32.4	43.2	62.5	19.3	
Vert	2402.000	PK	88.0	27.4	2.2	32.4	85.2	-	-	Carrier
Vert	2400.000	PK	48.8	27.4	2.2	32.4	46.0	65.2	19.2	

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	4804.000	AV	45.3	31.6	4.0	31.4	-23.9	25.6	53.9	28.3	
Vert	4804.000	AV	51.3	31.6	4.0	31.4	-23.9	31.6	53.9	22.3	

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).

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

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. 32IE0103-HO-01
Date 06/22/2012 06/24/2012
Temperature/ Humidity 23 deg.C/ 68% RH 22 deg.C/ 59% RH
Engineer Tomohisa Nakagawa Takumi Shimada
Below 1GHz Above 1GHz
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	98.302	QP	37.4	9.3	7.5	28.4	25.8	43.5	17.7	
Hori	122.877	QP	29.3	12.9	7.7	28.3	21.6	43.5	21.9	
Hori	256.497	QP	36.5	17.6	8.6	27.6	35.1	46.0	10.9	
Hori	344.058	QP	34.2	15.8	9.1	27.9	31.2	46.0	14.8	
Hori	512.997	QP	30.5	18.5	9.8	28.8	30.0	46.0	16.0	
Hori	769.492	QP	30.8	21.7	10.8	28.2	35.1	46.0	10.9	
Hori	1626.662	PK	50.1	25.4	1.8	33.3	44.0	73.9	30.0	
Hori	4882.000	PK	49.9	31.9	3.9	31.4	54.3	73.9	19.6	
Hori	1626.662	AV	45.8	25.4	1.8	33.3	39.7	53.9	14.2	
Vert	37.782	QP	33.8	15.1	6.8	28.6	27.1	40.0	12.9	
Vert	128.251	QP	36.4	13.3	7.7	28.2	29.2	43.5	14.3	
Vert	160.986	QP	35.3	15.4	7.9	28.1	30.5	43.5	13.0	
Vert	256.497	QP	34.1	17.6	8.6	27.6	32.7	46.0	13.3	
Vert	512.994	QP	32.8	18.5	9.8	28.8	32.3	46.0	13.7	
Vert	769.491	QP	28.0	21.7	10.8	28.2	32.3	46.0	13.7	
Vert	1626.573	PK	53.6	25.4	1.8	33.3	47.5	73.9	26.4	
Vert	4882.000	PK	54.3	31.9	3.9	31.4	58.7	73.9	15.2	
Vert	1626.573	AV	51.7	25.4	1.8	33.3	45.6	53.9	8.3	

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).

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

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

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	4882.000	AV	44.9	31.9	3.9	31.4	-23.9	25.4	53.9	28.5	
Vert	4882.000	AV	50.2	31.9	3.9	31.4	-23.9	30.7	53.9	23.2	

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).

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

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

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. : 32IE0103-HO-01
Date : 06/22/2012 06/24/2012
Temperature/ Humidity : 23 deg.C/ 68% RH 22 deg.C/ 59% RH
Engineer : Tomohisa Nakagawa Takumi Shimada
: Below 1GHz Above 1GHz
Mode : Tx, DH5 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	98.302	QP	36.9	9.3	7.5	28.4	25.3	43.5	18.2	
Hori	122.877	QP	28.3	12.9	7.7	28.3	20.6	43.5	22.9	
Hori	256.498	QP	33.5	17.6	8.6	27.6	32.1	46.0	13.9	
Hori	344.928	QP	34.3	15.8	9.1	27.9	31.3	46.0	14.7	
Hori	512.994	QP	30.7	18.5	9.8	28.8	30.2	46.0	15.8	
Hori	769.491	QP	29.9	21.7	10.8	28.2	34.2	46.0	11.8	
Hori	1652.617	PK	50.4	25.5	1.8	33.3	44.4	73.9	29.5	
Hori	2483.500	PK	43.0	27.7	2.2	32.3	40.6	73.9	33.3	
Hori	4960.000	PK	46.8	32.2	4.0	31.4	51.6	73.9	22.3	
Hori	1652.617	AV	46.3	25.5	1.8	33.3	40.3	53.9	13.6	
Hori	2483.500	AV	31.2	27.7	2.2	32.3	28.8	53.9	25.1	
Vert	37.800	QP	33.8	15.1	6.8	28.6	27.1	40.0	12.9	
Vert	128.248	QP	39.1	13.3	7.7	28.2	31.9	43.5	11.6	
Vert	161.036	QP	35.1	15.4	7.9	28.1	30.3	43.5	13.2	
Vert	256.498	QP	31.4	17.6	8.6	27.6	30.0	46.0	16.0	
Vert	512.995	QP	32.7	18.5	9.8	28.8	32.2	46.0	13.8	
Vert	769.491	QP	28.1	21.7	10.8	28.2	32.4	46.0	13.6	
Vert	1652.667	PK	51.9	25.5	1.8	33.3	45.9	73.9	28.0	
Vert	2483.500	PK	46.6	27.7	2.2	32.3	44.2	73.9	29.7	
Vert	4960.000	PK	53.7	32.2	4.0	31.4	58.5	73.9	15.4	
Vert	1652.667	AV	49.1	25.5	1.8	33.3	43.1	53.9	10.8	
Vert	2483.500	AV	33.1	27.7	2.2	32.3	30.7	53.9	23.2	

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).

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

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

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	4960.000	AV	42.0	32.2	4.0	31.4	-23.9	22.9	53.9	31.0	
Vert	4960.000	AV	49.2	32.2	4.0	31.4	-23.9	30.1	53.9	23.8	

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).

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

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. 32IE0103-HO-01
Date 06/22/2012 06/24/2012
Temperature/ Humidity 23 deg.C/ 68% RH 22 deg.C/ 59% RH
Engineer Tomohisa Nakagawa Takumi Shimada
Below 1GHz Above 1GHz
Mode Tx, 3DH5 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	107.999	QP	36.9	10.9	7.6	28.4	27.0	43.5	16.5	
Hori	122.876	QP	28.9	12.9	7.7	28.3	21.2	43.5	22.3	
Hori	256.497	QP	34.0	17.6	8.6	27.6	32.6	46.0	13.4	
Hori	344.055	QP	36.3	15.8	9.1	27.9	33.3	46.0	12.7	
Hori	512.993	QP	31.2	18.5	9.8	28.8	30.7	46.0	15.3	
Hori	769.492	QP	29.2	21.7	10.8	28.2	33.5	46.0	12.5	
Hori	1601.991	PK	49.4	25.4	1.8	33.4	43.2	73.9	30.7	
Hori	2390.000	PK	41.6	27.4	2.2	32.4	38.8	73.9	35.1	
Hori	4804.000	PK	45.4	31.6	4.0	31.4	49.6	73.9	24.3	
Hori	1601.991	AV	44.5	25.4	1.8	33.4	38.3	53.9	15.6	
Hori	2390.000	AV	30.0	27.4	2.2	32.4	27.2	53.9	26.7	
Vert	34.042	QP	30.4	16.5	6.8	28.5	25.2	40.0	14.8	
Vert	128.250	QP	38.5	13.3	7.7	28.2	31.3	43.5	12.2	
Vert	155.919	QP	33.3	15.2	7.9	28.1	28.3	43.5	15.2	
Vert	256.499	QP	33.7	17.6	8.6	27.6	32.3	46.0	13.7	
Vert	512.995	QP	32.9	18.5	9.8	28.8	32.4	46.0	13.6	
Vert	769.491	QP	31.3	21.7	10.8	28.2	35.6	46.0	10.4	
Vert	1601.971	PK	56.7	25.4	1.8	33.4	50.5	73.9	23.4	
Vert	2390.000	PK	42.7	27.4	2.2	32.4	39.9	73.9	34.0	
Vert	4804.000	PK	51.8	31.6	4.0	31.4	56.0	73.9	17.9	
Vert	1601.971	AV	55.6	25.4	1.8	33.4	49.4	53.9	4.5	
Vert	2390.000	AV	30.0	27.4	2.2	32.4	27.2	53.9	26.7	

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).

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

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

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	84.1	27.4	2.2	32.4	81.3	-	-	Carrier
Hori	2400.000	PK	43.8	27.4	2.2	32.4	41.0	61.3	20.3	
Vert	2402.000	PK	87.3	27.4	2.2	32.4	84.5	-	-	Carrier
Vert	2400.000	PK	45.6	27.4	2.2	32.4	42.8	64.5	21.7	

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	4804.000	AV	35.5	31.6	4.0	31.4	-23.9	15.8	53.9	38.1	
Vert	4804.000	AV	42.5	31.6	4.0	31.4	-23.9	22.8	53.9	31.1	

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).

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

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. 32IE0103-HO-01
Date 06/22/2012 06/24/2012
Temperature/ Humidity 23 deg.C/ 68% RH 22 deg.C/ 59% RH
Engineer Tomohisa Nakagawa Takumi Shimada
Below 1GHz Above 1GHz
Mode Tx, 3DH5 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	108.002	QP	37.3	10.9	7.6	28.4	27.4	43.5	16.1	
Hori	122.876	QP	29.4	12.9	7.7	28.3	21.7	43.5	21.8	
Hori	256.498	QP	33.9	17.6	8.6	27.6	32.5	46.0	13.5	
Hori	344.054	QP	36.4	15.8	9.1	27.9	33.4	46.0	12.6	
Hori	512.993	QP	31.0	18.5	9.8	28.8	30.5	46.0	15.5	
Hori	769.490	QP	29.1	21.7	10.8	28.2	33.4	46.0	12.6	
Hori	1626.672	PK	49.3	25.4	1.8	33.3	43.2	73.9	30.7	
Hori	4882.000	PK	46.7	31.9	3.9	31.4	51.1	73.9	22.8	
Hori	1626.672	AV	44.6	25.4	1.8	33.3	38.5	53.9	15.4	
Vert	33.995	QP	30.2	16.5	6.8	28.5	25.0	40.0	15.0	
Vert	128.247	QP	38.6	13.3	7.7	28.2	31.4	43.5	12.1	
Vert	155.876	QP	33.1	15.2	7.9	28.1	28.1	43.5	15.4	
Vert	256.498	QP	32.3	17.6	8.6	27.6	30.9	46.0	15.1	
Vert	512.995	QP	31.7	18.5	9.8	28.8	31.2	46.0	14.8	
Vert	769.488	QP	31.2	21.7	10.8	28.2	35.5	46.0	10.5	
Vert	1626.667	PK	53.5	25.4	1.8	33.3	47.4	73.9	26.5	
Vert	4882.000	PK	49.1	31.9	3.9	31.4	53.5	73.9	20.4	
Vert	1626.667	AV	52.5	25.4	1.8	33.3	46.4	53.9	7.5	

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).

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

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

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	4882.000	AV	37.3	31.9	3.9	31.4	-23.9	17.8	53.9	36.1	
Vert	4882.000	AV	42.2	31.9	3.9	31.4	-23.9	22.7	53.9	31.2	

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).

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

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. 32IE0103-HO-01
Date 06/22/2012 06/24/2012
Temperature/ Humidity 23 deg.C/ 68% RH 22 deg.C/ 59% RH
Engineer Tomohisa Nakagawa Takumi Shimada
Below 1GHz Above 1GHz
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	98.234	QP	38.2	9.3	7.5	28.4	26.6	43.5	16.9	
Hori	122.878	QP	29.1	12.9	7.7	28.3	21.4	43.5	22.1	
Hori	256.493	QP	36.8	17.6	8.6	27.6	35.4	46.0	10.6	
Hori	344.061	QP	33.6	15.8	9.1	27.9	30.6	46.0	15.4	
Hori	512.993	QP	31.5	18.5	9.8	28.8	31.0	46.0	15.0	
Hori	769.492	QP	27.3	21.7	10.8	28.2	31.6	46.0	14.4	
Hori	1652.650	PK	50.2	25.5	1.8	33.3	44.2	73.9	29.7	
Hori	2483.500	PK	45.7	27.7	2.2	32.3	43.3	73.9	30.6	
Hori	4960.000	PK	47.8	32.2	4.0	31.4	52.6	73.9	21.3	
Hori	1652.650	AV	45.5	25.5	1.8	33.3	39.5	53.9	14.4	
Hori	2483.500	AV	32.5	27.7	2.2	32.3	30.1	53.9	23.9	
Vert	38.089	QP	33.6	15.0	6.8	28.6	26.8	40.0	13.2	
Vert	128.247	QP	38.7	13.3	7.7	28.2	31.5	43.5	12.0	
Vert	161.036	QP	36.2	15.4	7.9	28.1	31.4	43.5	12.1	
Vert	256.496	QP	30.8	17.6	8.6	27.6	29.4	46.0	16.6	
Vert	512.920	QP	33.2	18.5	9.8	28.8	32.7	46.0	13.3	
Vert	769.490	QP	28.2	21.7	10.8	28.2	32.5	46.0	13.5	
Vert	1652.658	PK	52.5	25.5	1.8	33.3	46.5	73.9	27.4	
Vert	2483.500	PK	49.1	27.7	2.2	32.3	46.7	73.9	27.2	
Vert	4960.000	PK	51.6	32.2	4.0	31.4	56.4	73.9	17.5	
Vert	1652.658	AV	49.6	25.5	1.8	33.3	43.6	53.9	10.3	
Vert	2483.500	AV	34.9	27.7	2.2	32.3	32.5	53.9	21.4	

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).

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

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

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	4960.000	AV	38.6	32.2	4.0	31.4	-23.9	19.5	53.9	34.4	
Vert	4960.000	AV	42.6	32.2	4.0	31.4	-23.9	23.5	53.9	30.4	

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

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

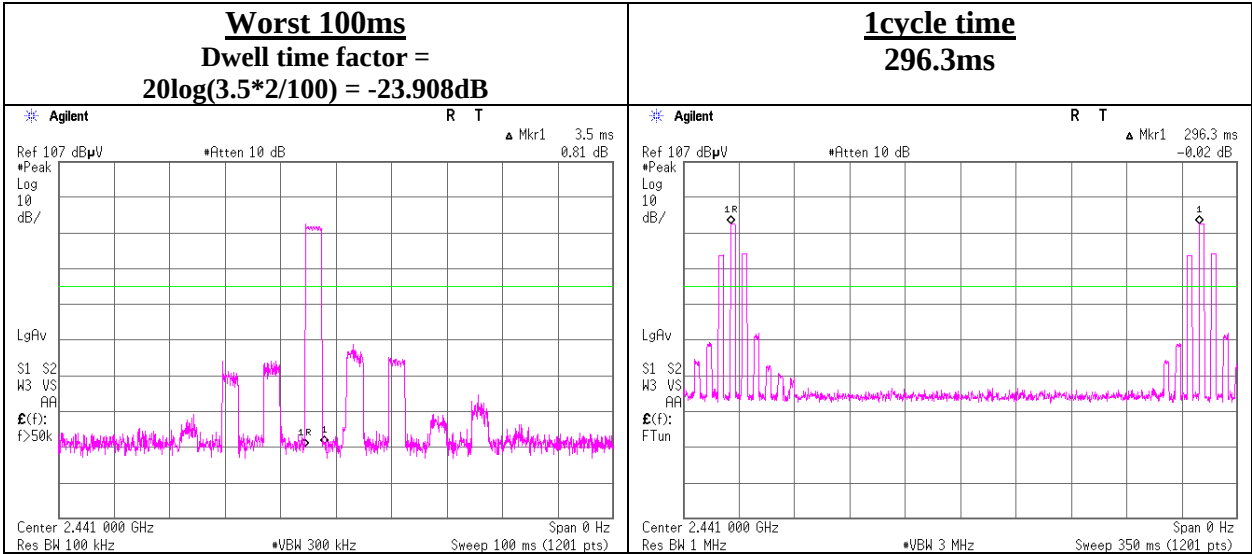
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

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

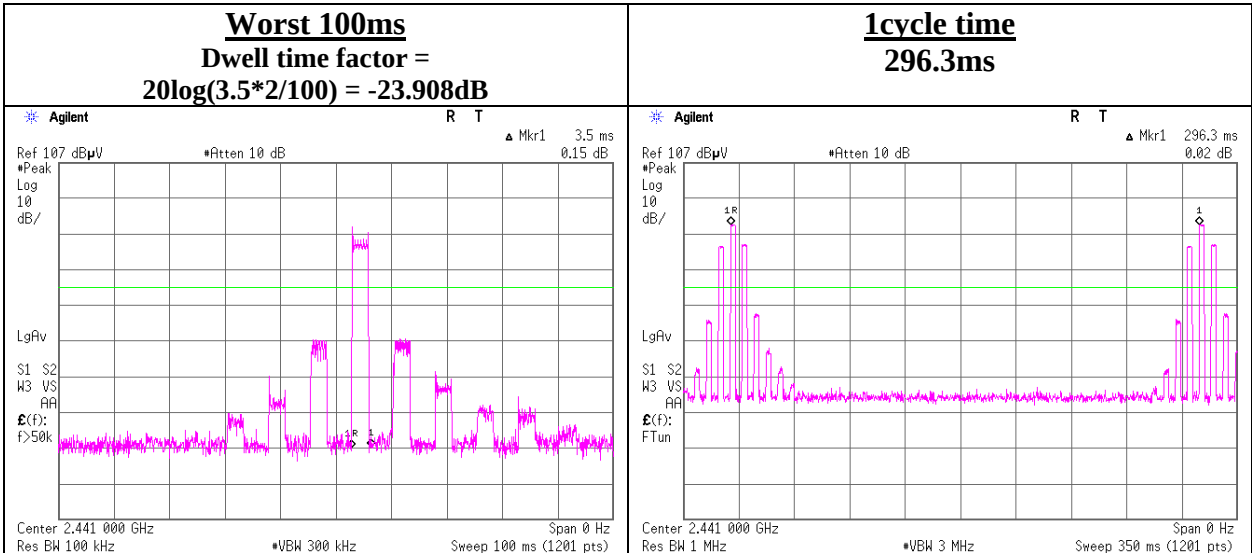
Distance factor: 10GHz-26.5GHz $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
26.5GHz-40GHz $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

Dwell time factor

DH5



3DH5



Conducted Spurious Emission

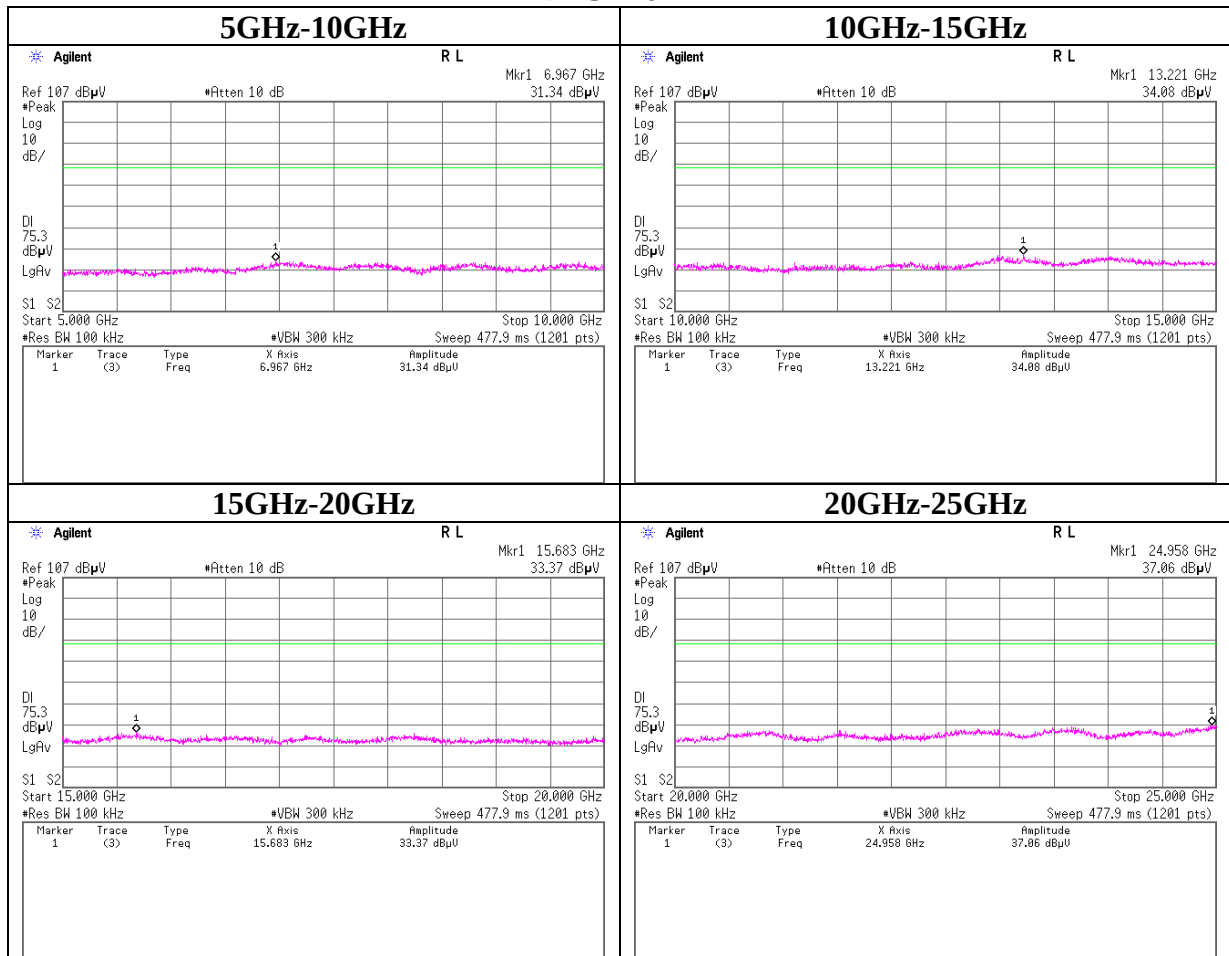
Tx DH5 2402MHz



* For 9kHz - 150kHz, no noise was found at radiated emission test at a distance of 3m.

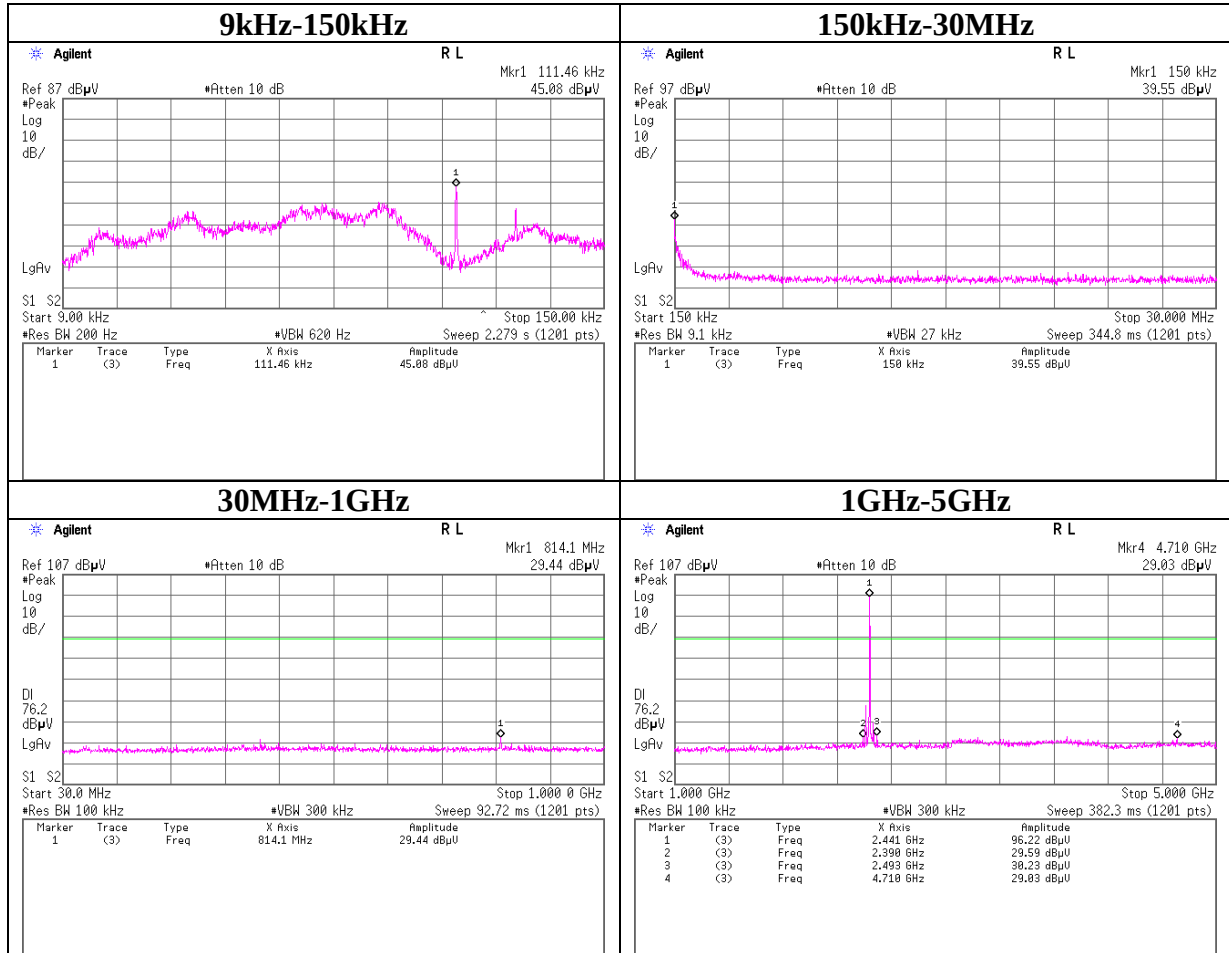
Conducted Spurious Emission

Tx DH5 2402MHz



Conducted Spurious Emission

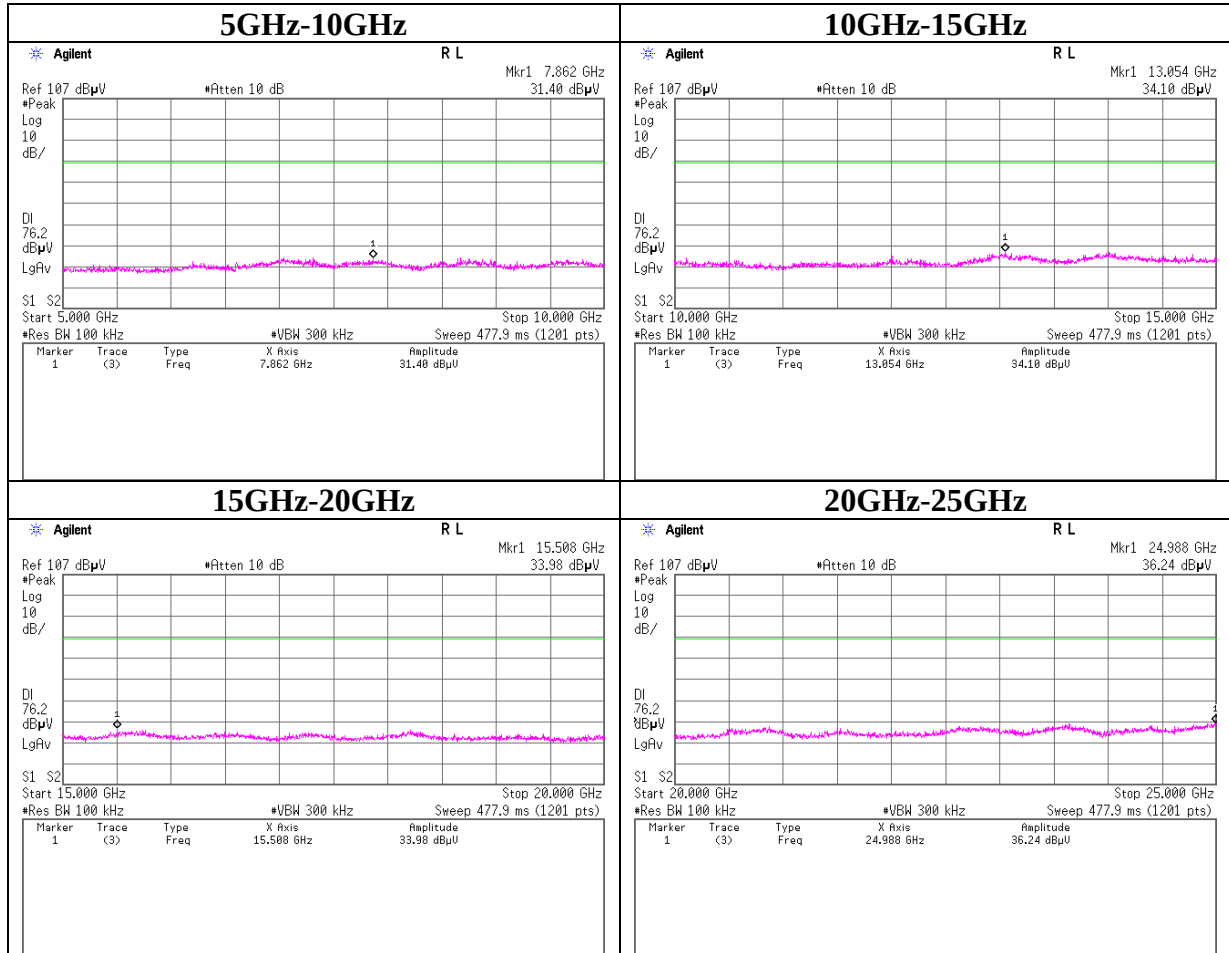
Tx DH5 2441MHz



* For 9kHz - 150kHz, no noise was found at radiated emission test at a distance of 3m.

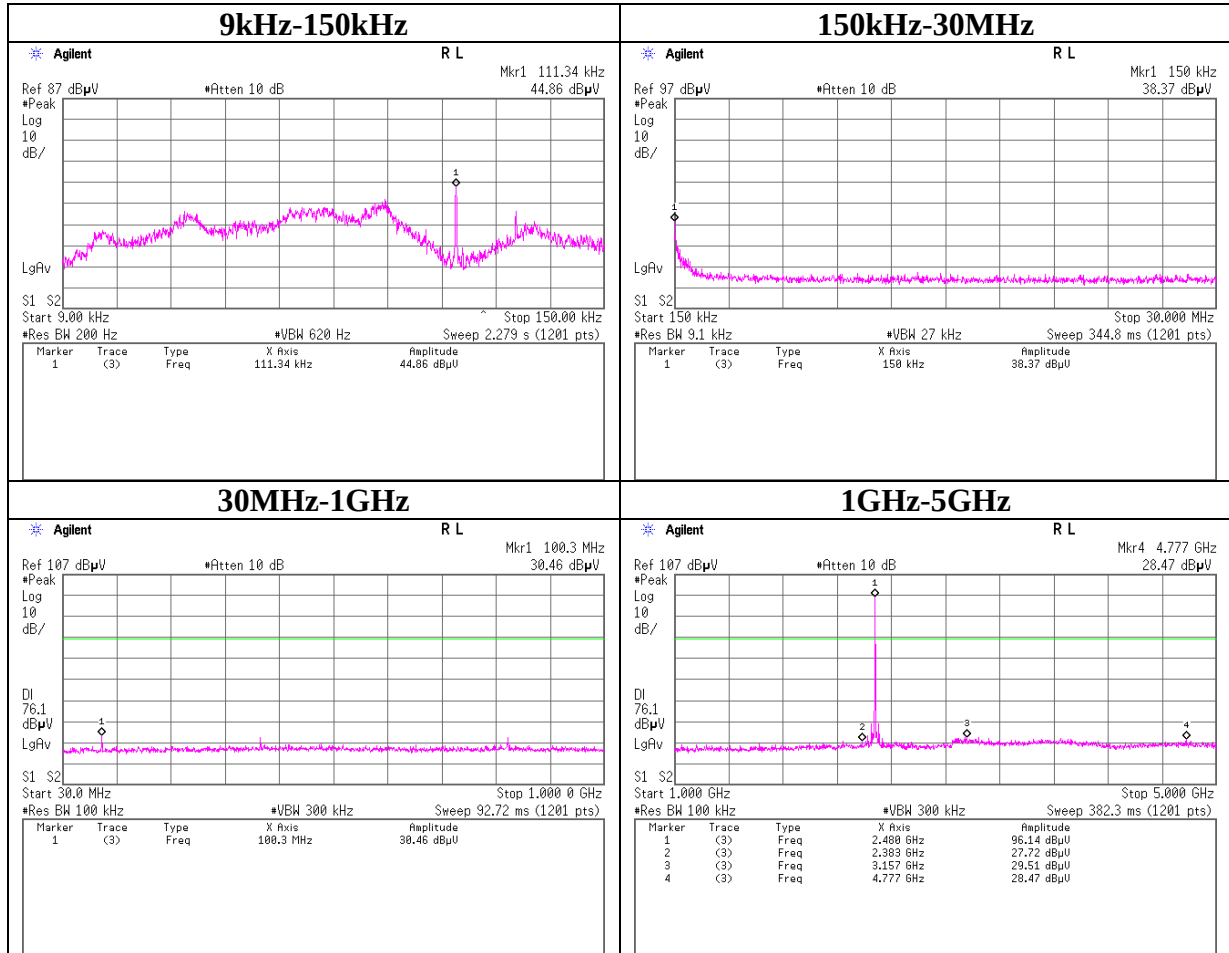
Conducted Spurious Emission

Tx DH5 2441MHz



Conducted Spurious Emission

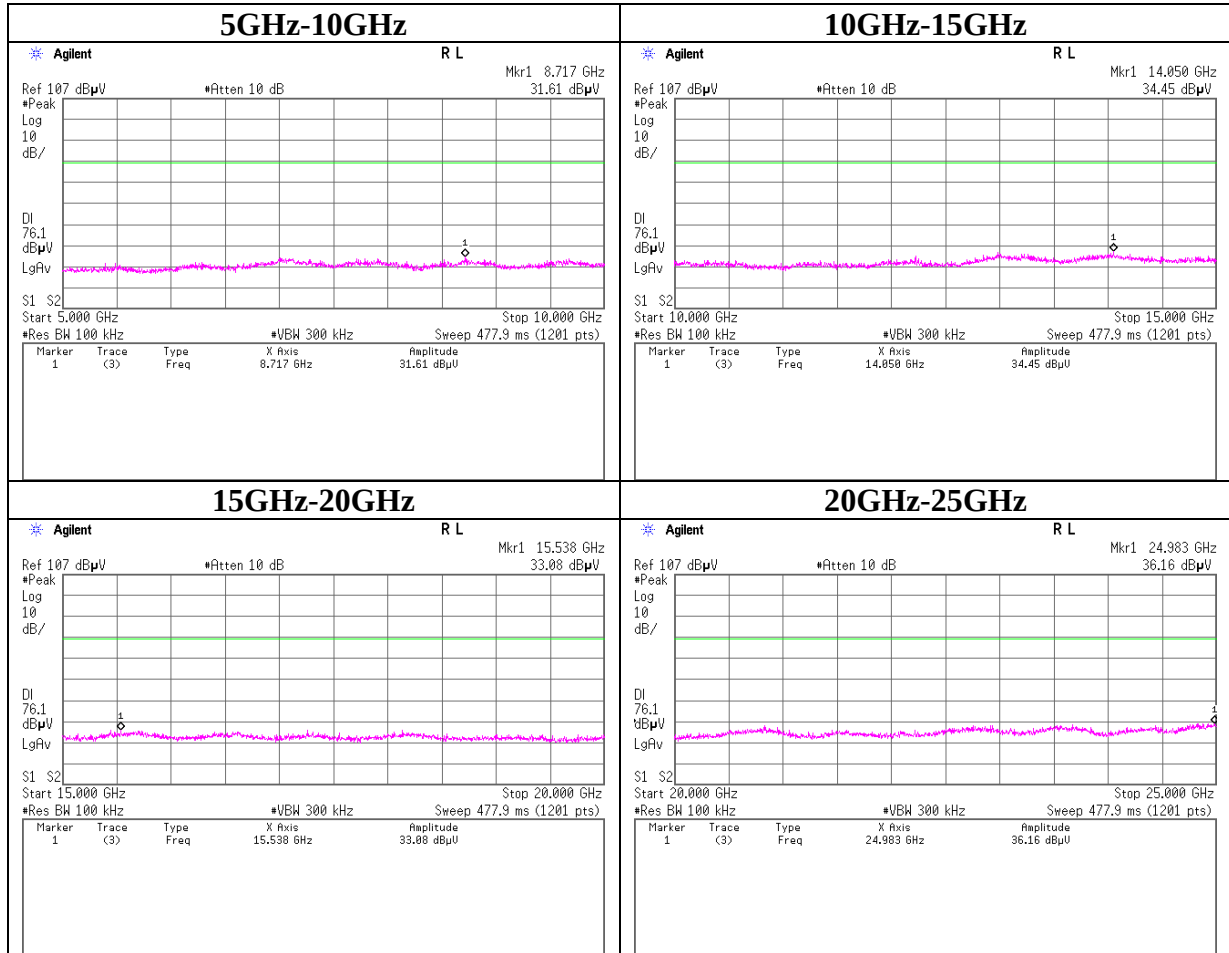
Tx DH5 2480MHz



* For 9kHz - 150kHz, no noise was found at radiated emission test at a distance of 3m.

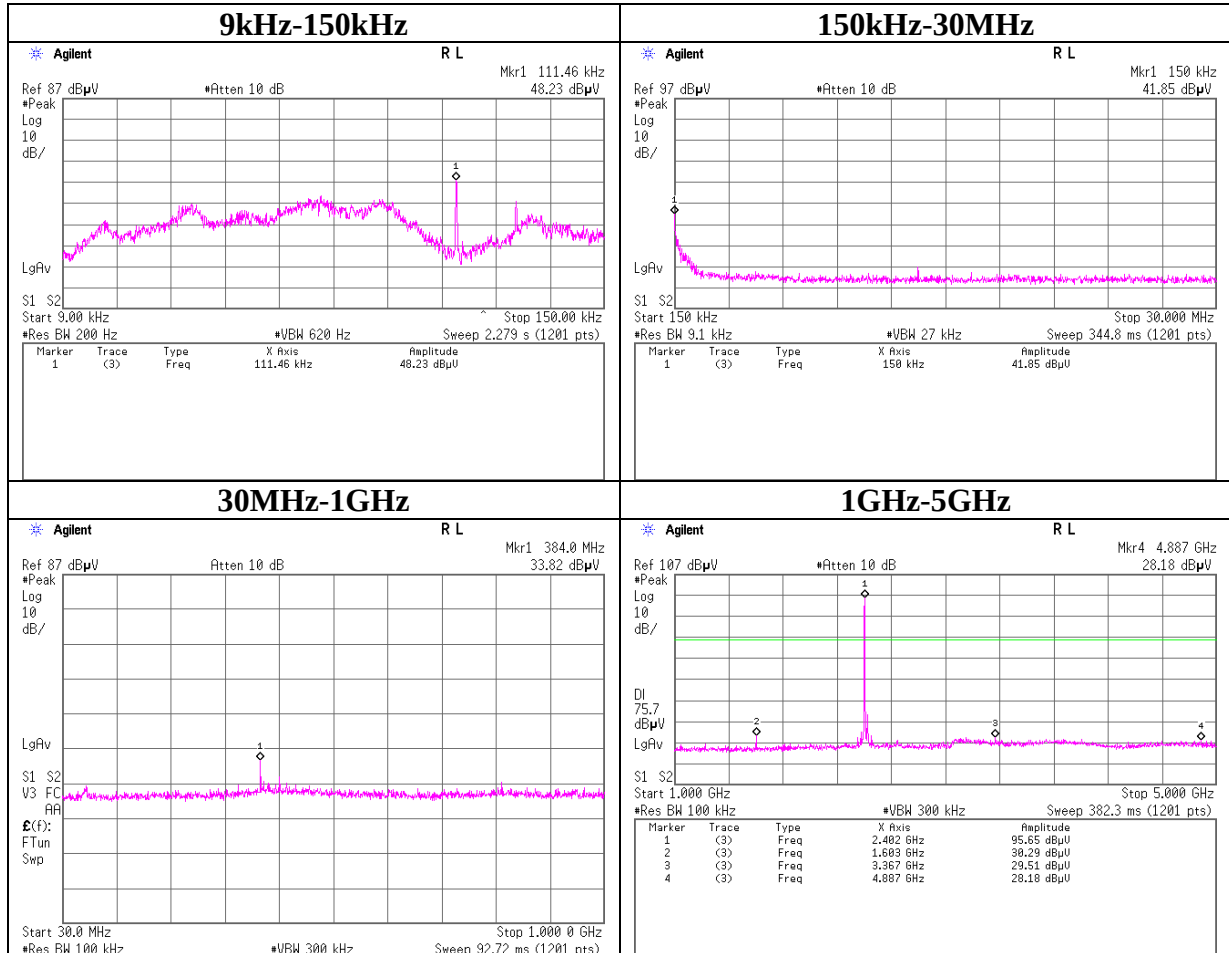
Conducted Spurious Emission

Tx DH5 2480MHz



Conducted Spurious Emission

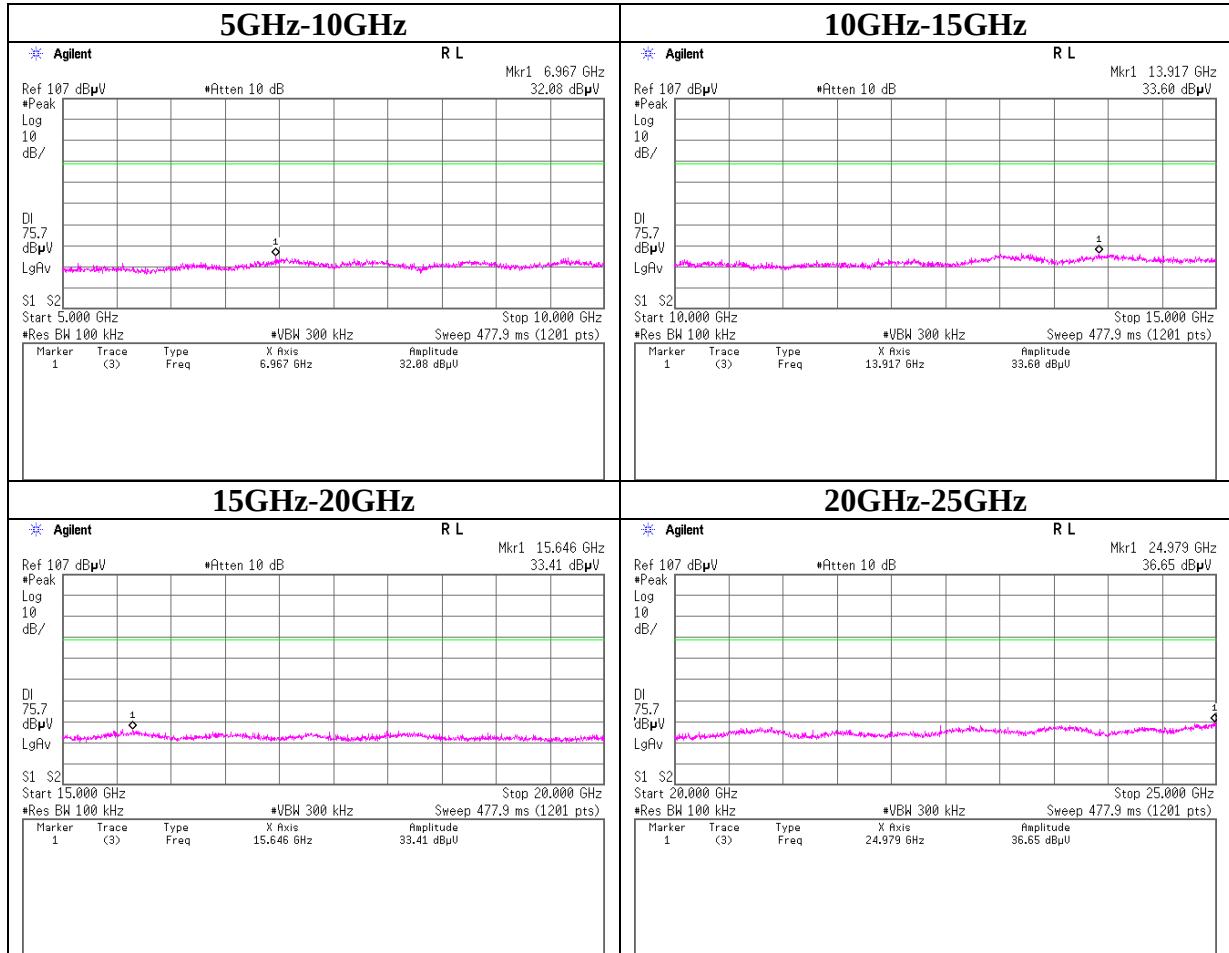
Tx 3DH5 2402MHz



* For 9kHz - 150kHz, no noise was found at radiated emission test at a distance of 3m.

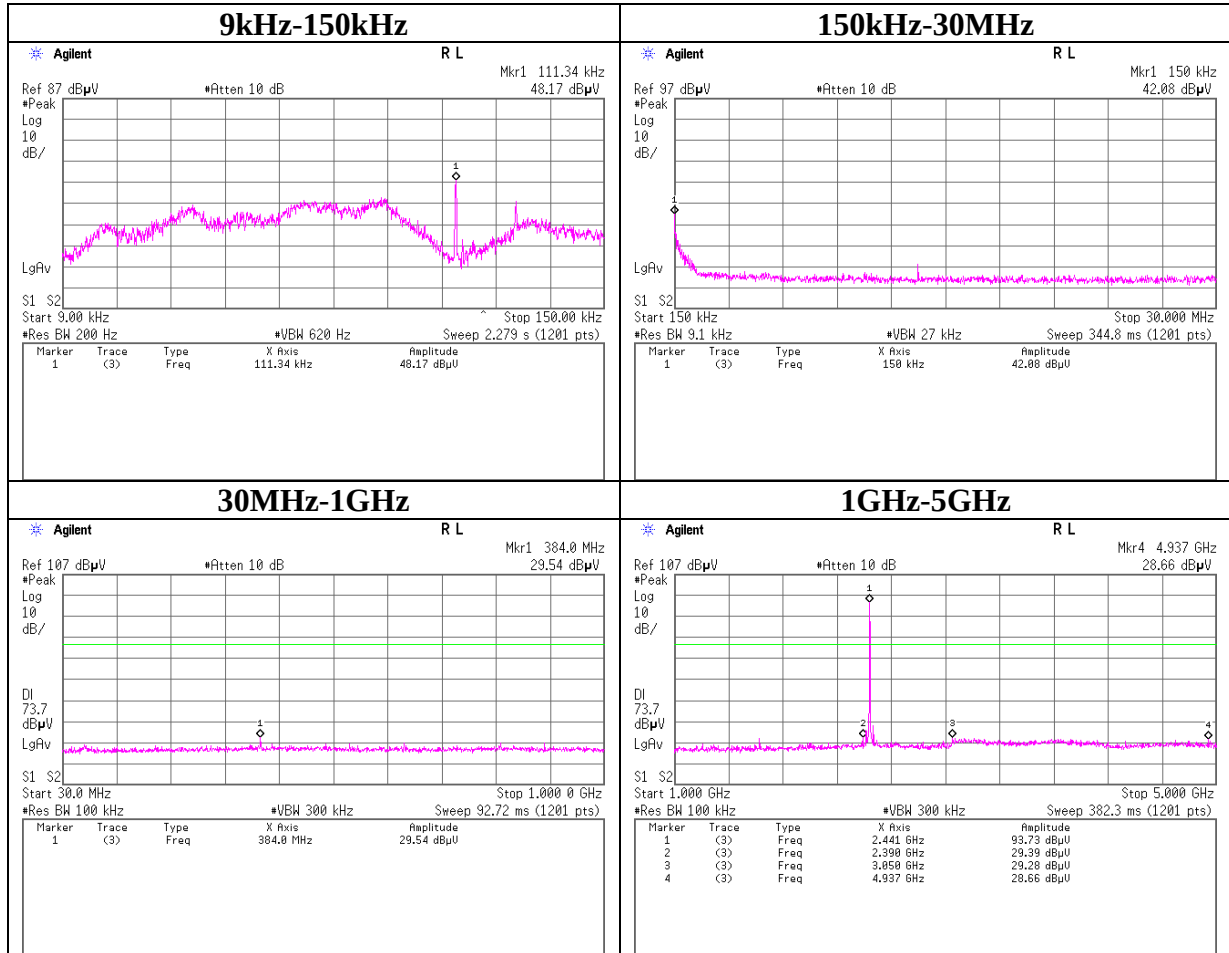
Conducted Spurious Emission

Tx 3DH5 2402MHz



Conducted Spurious Emission

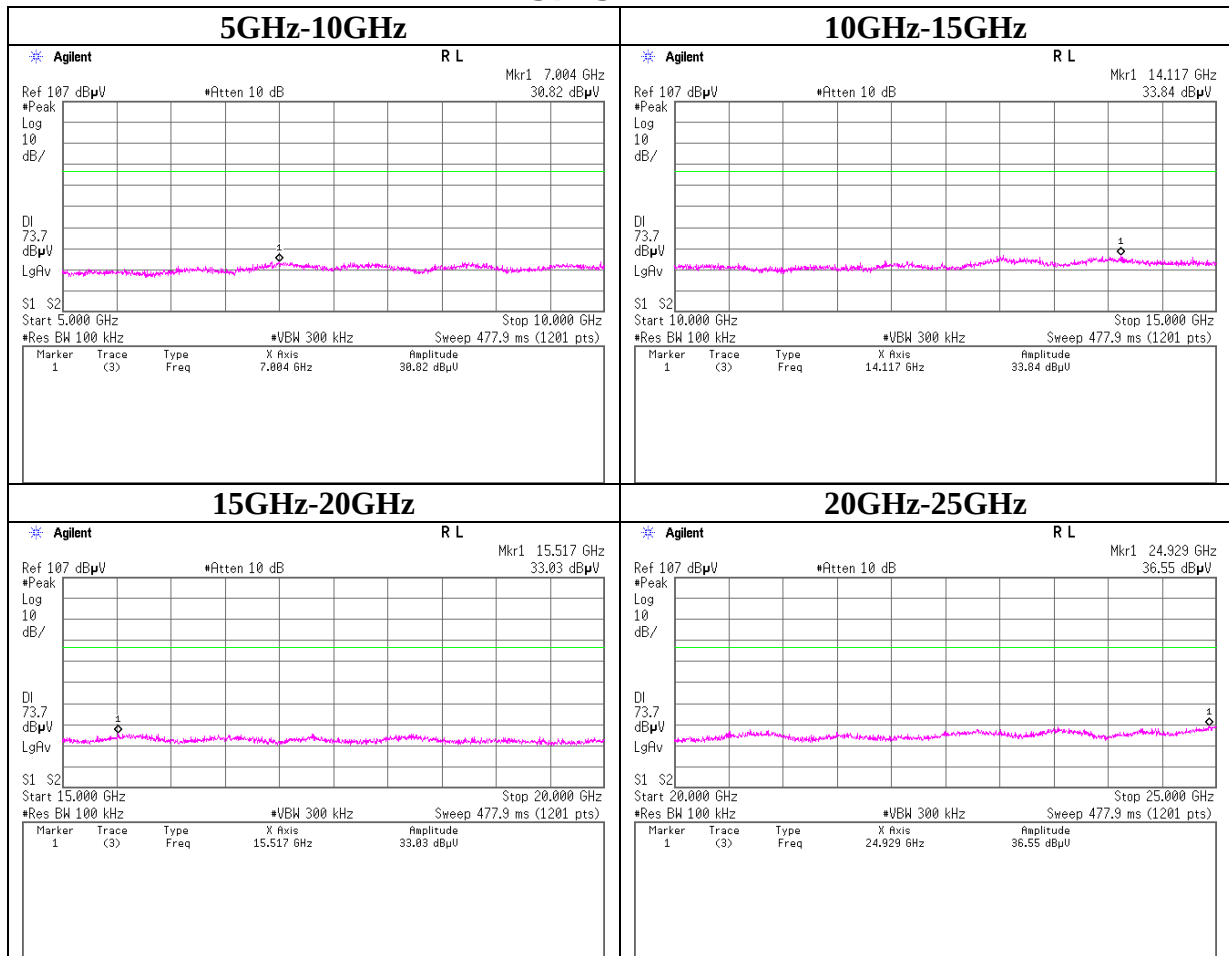
Tx 3DH5 2441MHz



* For 9kHz - 150kHz, no noise was found at radiated emission test at a distance of 3m.

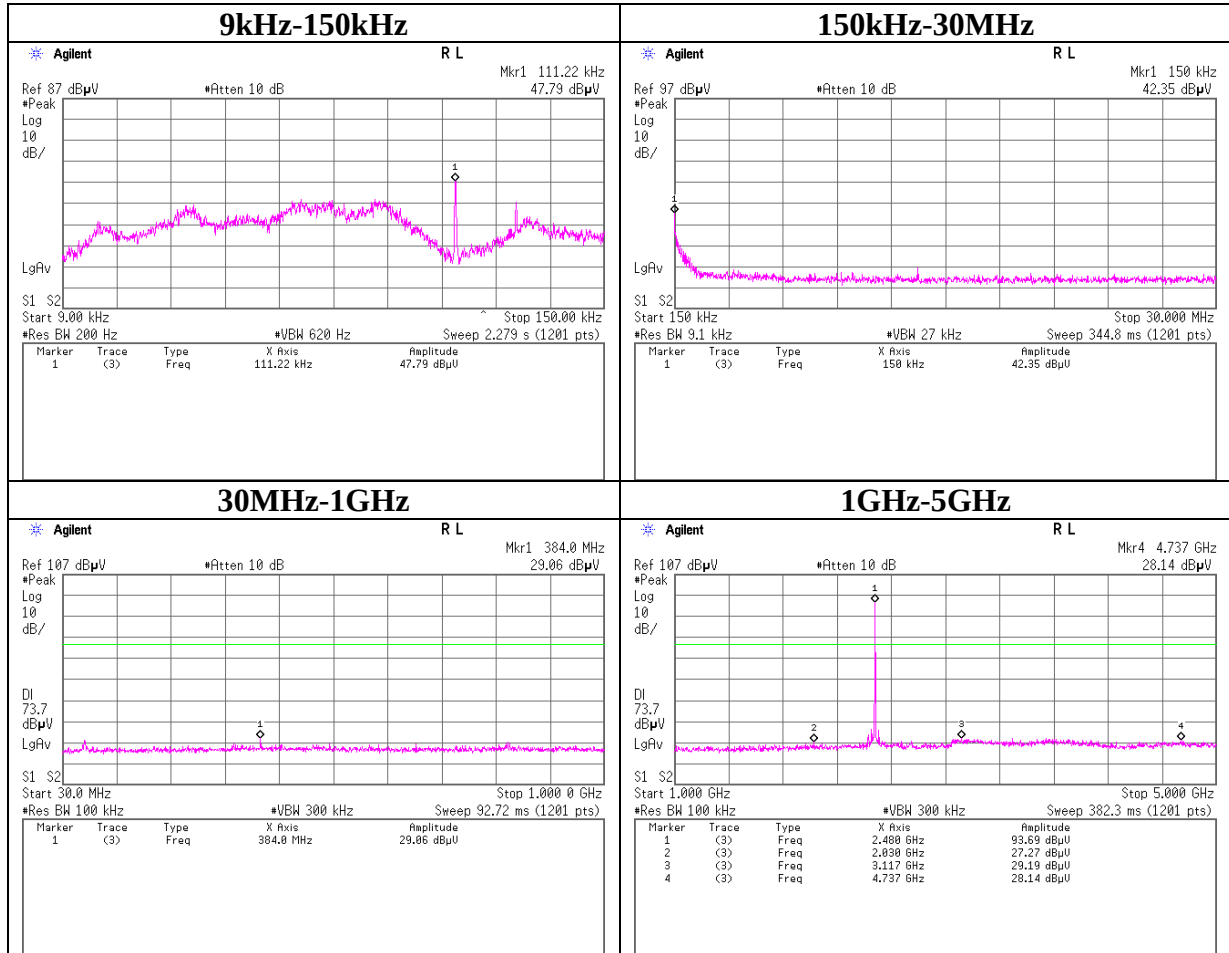
Conducted Spurious Emission

Tx 3DH5 2441MHz



Conducted Spurious Emission

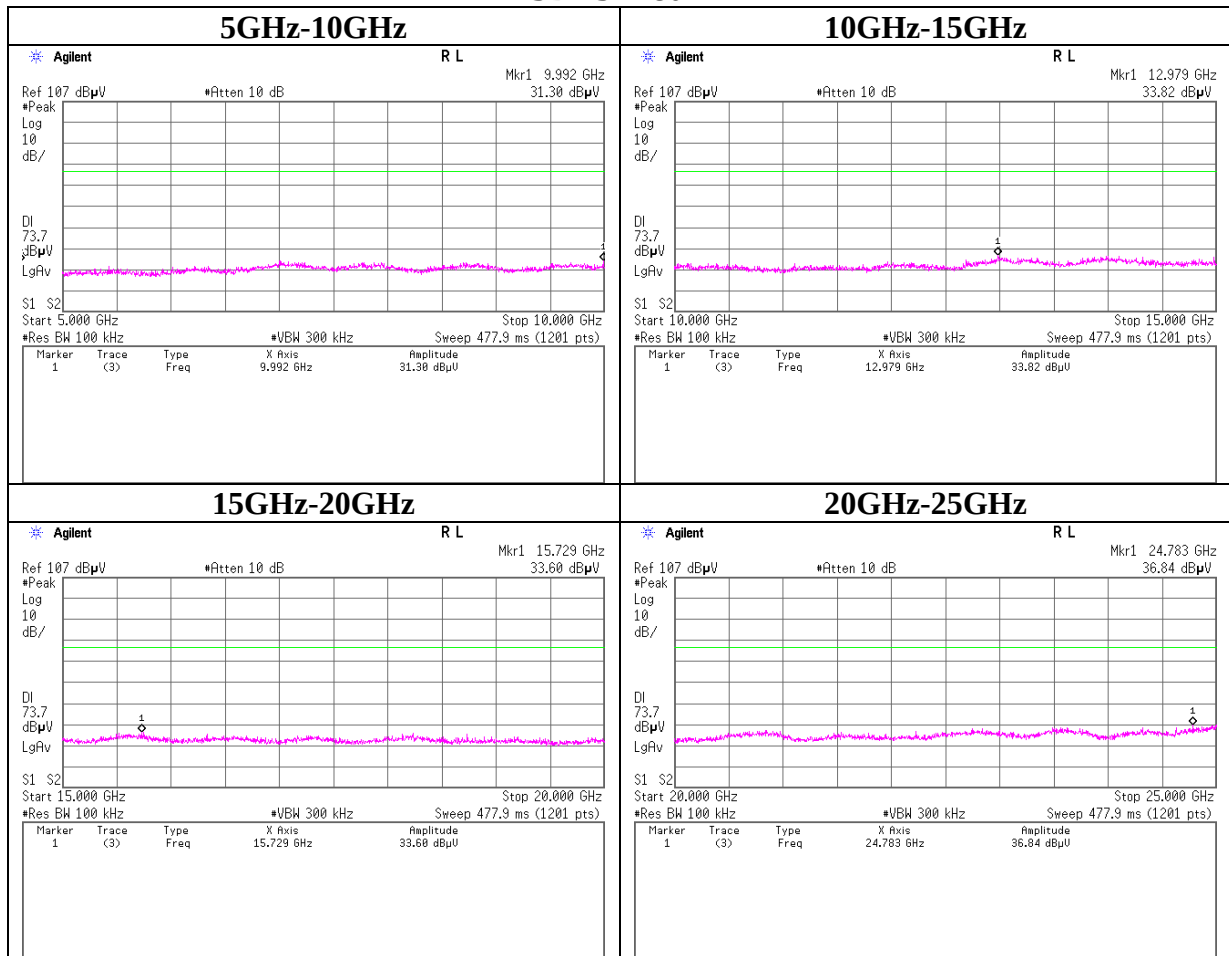
Tx 3DH5 2480MHz



* For 9kHz - 150kHz, no noise was found at radiated emission test at a distance of 3m.

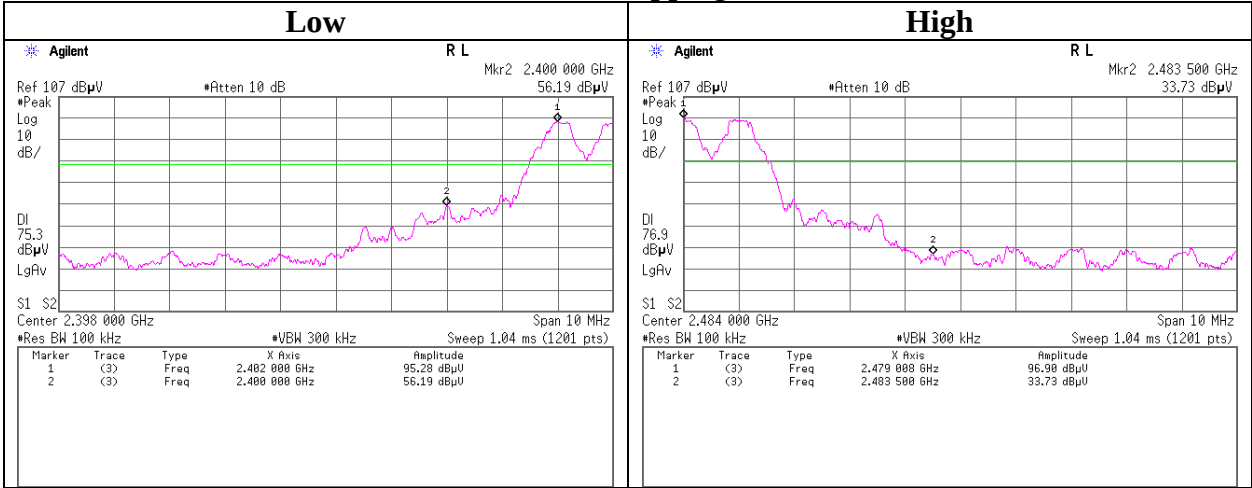
Conducted Spurious Emission

Tx 3DH5 2480MHz

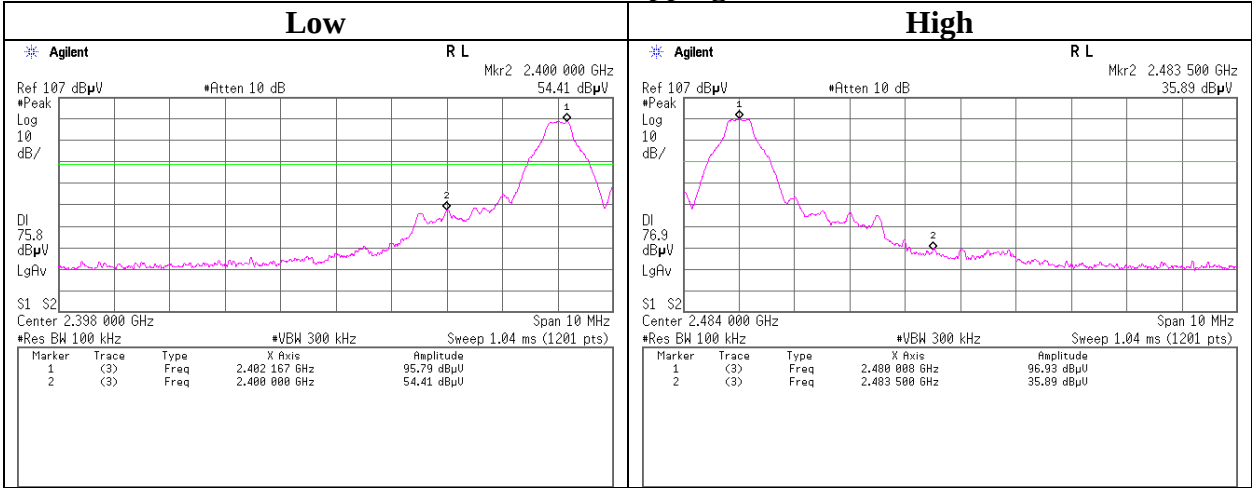


Conducted Emission Band Edge compliance

Tx DH5, Hopping on

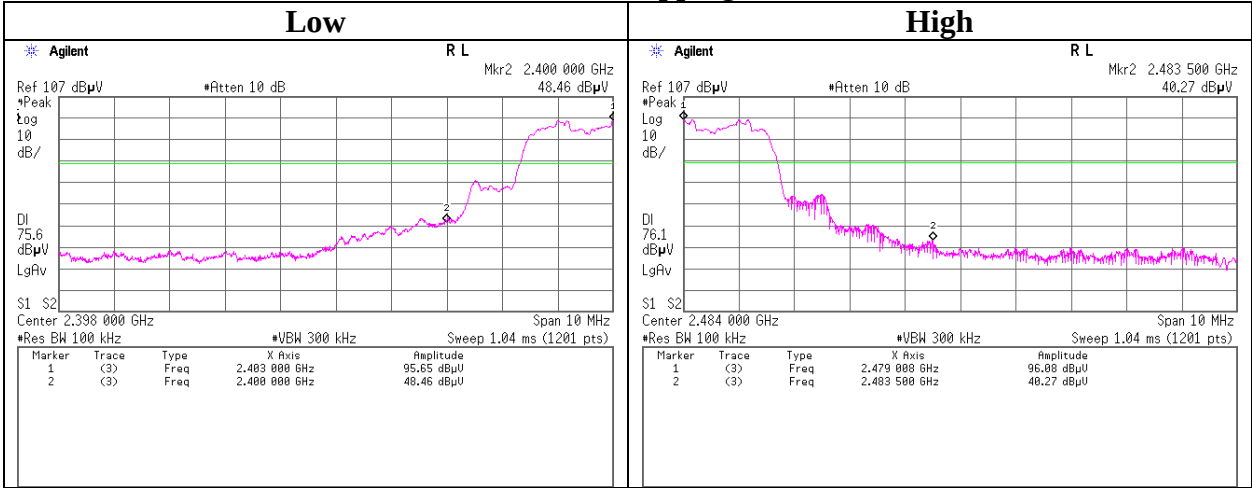


Tx DH5, Hopping off

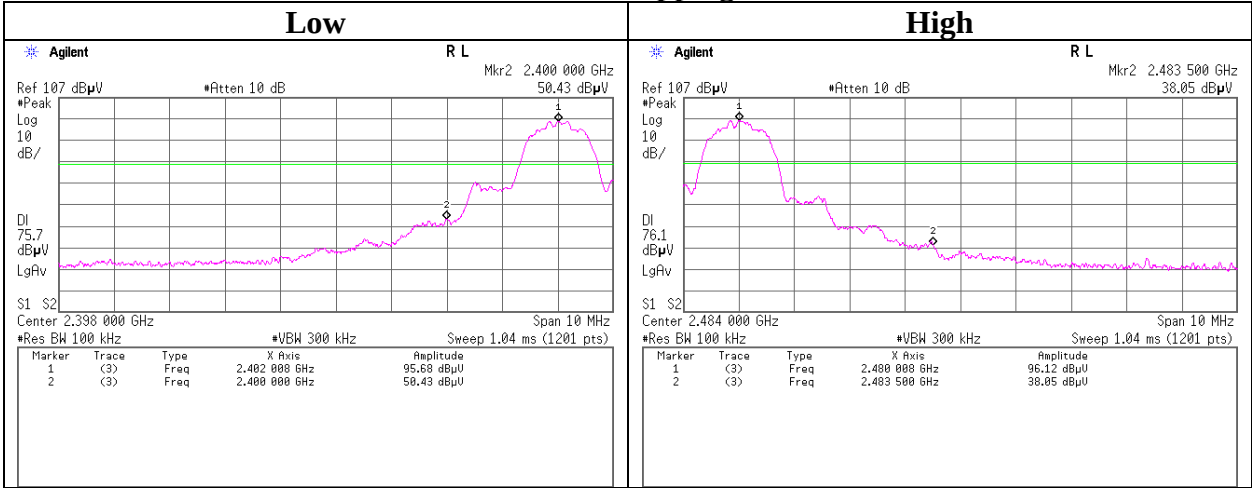


Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on



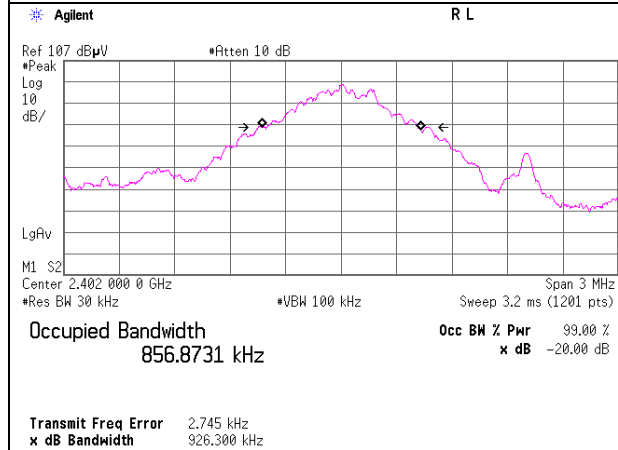
Tx 3DH5, Hopping off



99%Occupied Bandwidth

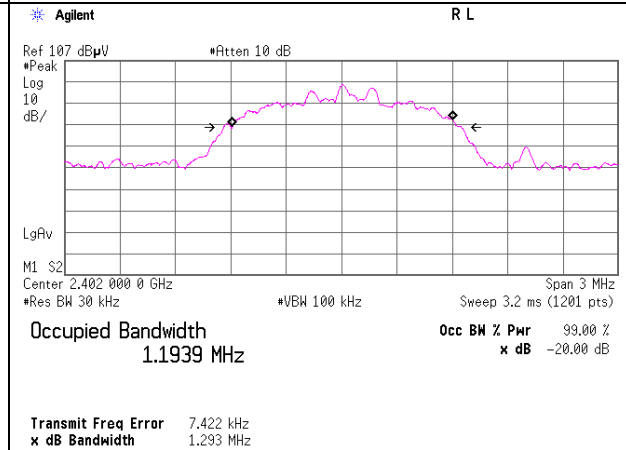
Tx DH5, Hopping off

2402MHz

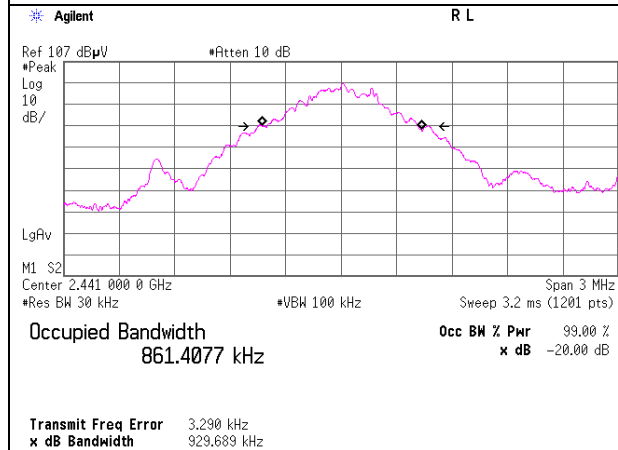


Tx 3DH5, Hopping off

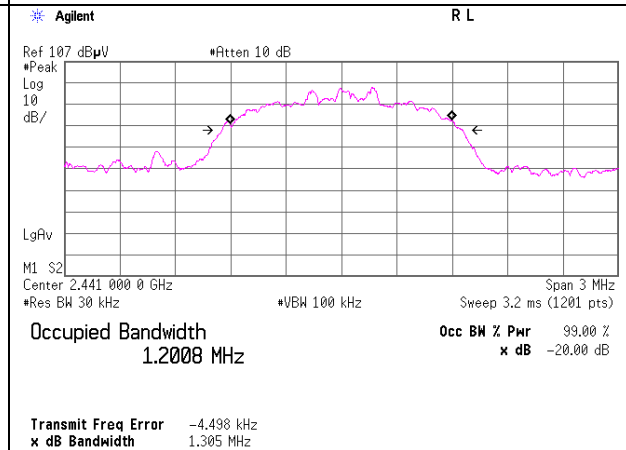
2402MHz



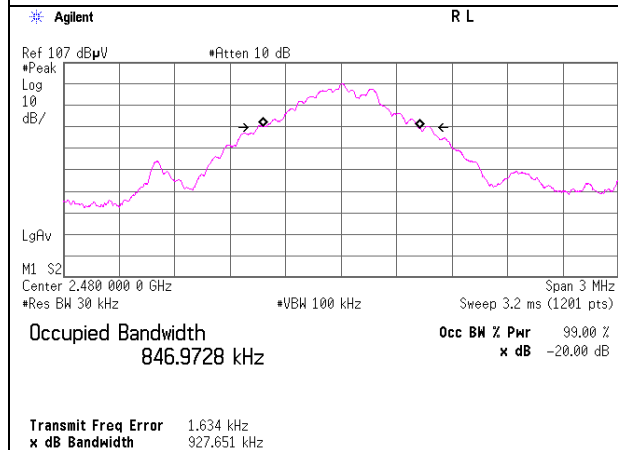
2441MHz



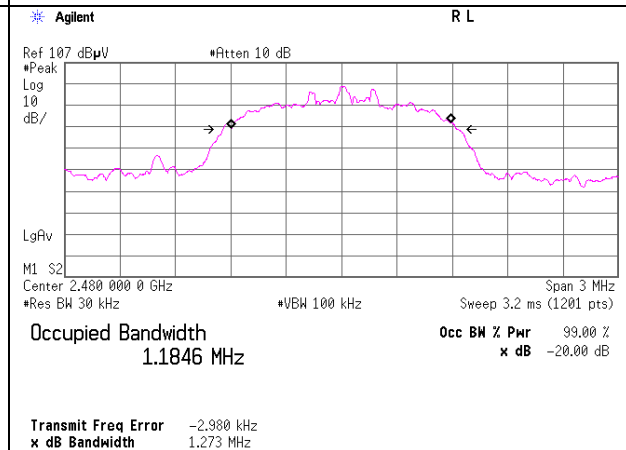
2441MHz



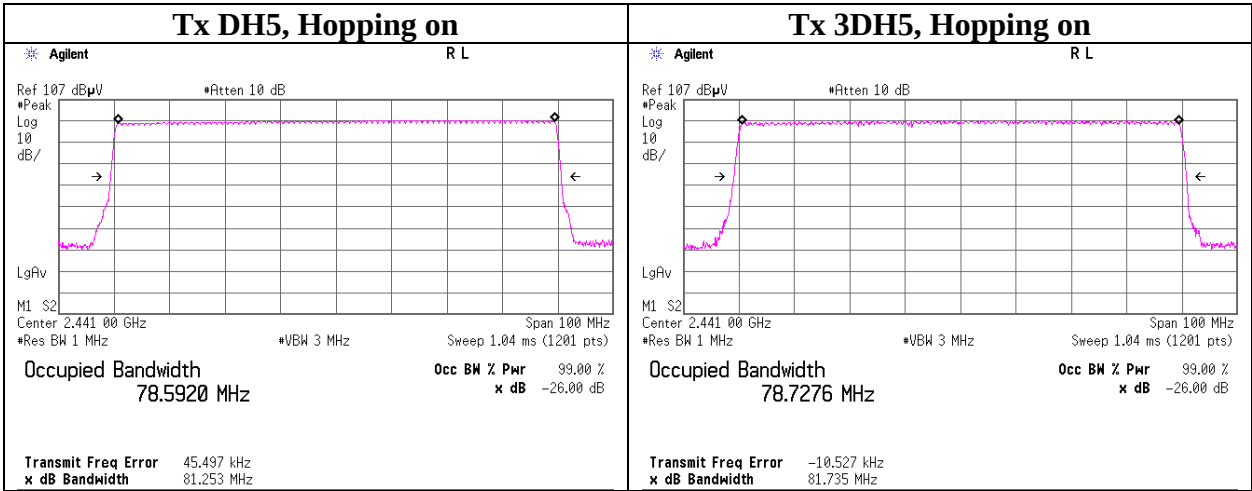
2480MHz



2480MHz



99% Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2012/02/06 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT	2012/04/06 * 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
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2011/10/28 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2012/01/12 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2011/06/21 * 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	-
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
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2012/06/19 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2012/05/25 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2012/03/29 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2012/05/21 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2011/10/19 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	RE	2011/07/15 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2011/07/28 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2012/04/05 * 12

EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2012/02/24 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2012/02/06 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE/CE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE/CE	2012/02/03 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	CE	2011/08/11 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2012/02/06 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(AE)	2012/02/09 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2012/01/11 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	CE	2011/07/15 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12

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