



RADIO TEST REPORT

Test Report No. : 33BE0184-HO-02-A-R1

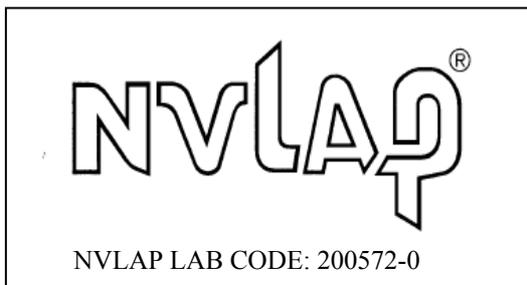
Applicant : Panasonic Corporation of North America
Type of Equipment : Wireless Speaker System
Model No. : SB-NE5
FCC ID : ACJ-SB-NE5
Test regulation : FCC Part 15 Subpart C: 2012
*Bluetooth part
Test Result : Complied

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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 33BE0184-HO-02-A. 33BE0184-HO-02-A is replaced with this report.

Date of test: October 16, 2012 to January 22, 2013

Representative test engineer: T. Nakagawa
Tomohisa Nakagawa
Engineer of WiSE Japan,
UL Verification Service

Approved by: Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



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>

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13-EM-F0429

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SECTION 1: Customer information

Company Name : Panasonic Corporation *
Address : 1006 Oaza Kadoma, Kadoma-shi, Osaka 571-8501 Japan
Telephone Number : +81-50-3487-3469
Facsimile Number : +81-6-6906-8800
Contact Person : Kazuo Taniguchi

*Panasonic Corporation is on behalf of the applicant: Panasonic Corporation of North America.

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless Speaker System
Model No. : SB-NE5
Serial No. : Refer to Clause 4.2
Rating : AC120V
Receipt Date of Sample : October 16, 2012
Country of Mass-production : Malaysia
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

[Airplay]

Radio Type : Transceiver
Frequency of Operation : 2412-2462MHz
Modulation : DSSS/OFDM
Power Supply (inner) : DC 3.3V
Antenna type / Antenna Gain : Internal Antenna: 2.65dBi(Antenna1)
External Antenna: 3.65dBi(Antenna2)

[Bluetooth]

Radio Type : Transceiver
Frequency of Operation : 2402-2480MHz
Modulation : FHSS
Power Supply (inner) : DC3.3V
Antenna type : Pattern Antenna
Antenna Gain : 4.85dBi

Variant model: SC-NE3

SB-NE5 has a variant model: SC-NE3.

Difference from SB-NE5 is the non-existence of FM Tuner.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on August 13, 2012 and effective September 12, 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 EUT complies with FCC Part 15 Subpart B: 2012, final revised on August 13, 2012 and effective September 12, 2012.

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 22.7dB, 1.12118MHz, N AV 20.5dB, 0.76841MHz, N	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(a)(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		4.2dB 4804.000MHz, 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.

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FCC 15.31 (e)

This EUT provides stable voltage (DC3.3V) constantly to RF Module 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						
	(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.

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3.5 Test Location

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	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.

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

4.1 Operating Mode(s)

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9
*Inquiry mode was not able to function on test tool.

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
<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: CSR Blue Test 3 Version 2.2.0.0 Software: Ext 255 Int 50 *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.</p>		

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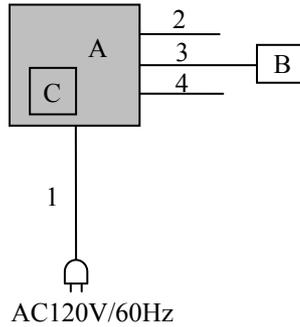
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4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Wireless Speaker System	SB-NE5	001	Panasonic	EUT
B	iPod	MC525J/A	-	Apple	-
C	Bluetooth Module	RJB3603A	1011 15 102012 *1) 001 *2)	CSR	EUT

*1) Used for Antenna Terminal Conducted test

*2) Used for Conducted and Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Cable	1.5	Unshielded	Unshielded	-
2	FM Ant Cable	1.2	Unshielded	Unshielded	-
3	Audio Cable	3.0	Shielded	Shielded	-
4	Audio Cable	3.0	Shielded	Shielded	-

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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**

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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.

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 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 : 30M-25GHz
Test data : APPENDIX
Test result : Pass

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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				
Conducted Spurious Emission Band Edge compliance	10MHz	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 not detected 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**

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APPENDIX 1: Data of EMI test

Conducted Emission

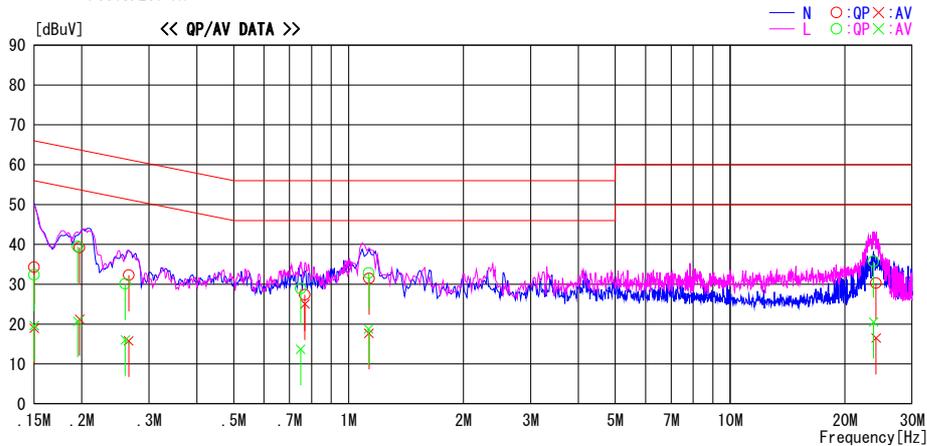
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2013/01/22

Report No. : 33BE0184-H0-02
Temp./Humi. : 24deg. C / 35% RH
Engineer : Tomohisa Nakagawa

Mode / Remarks : BT Tx BDR 2441MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

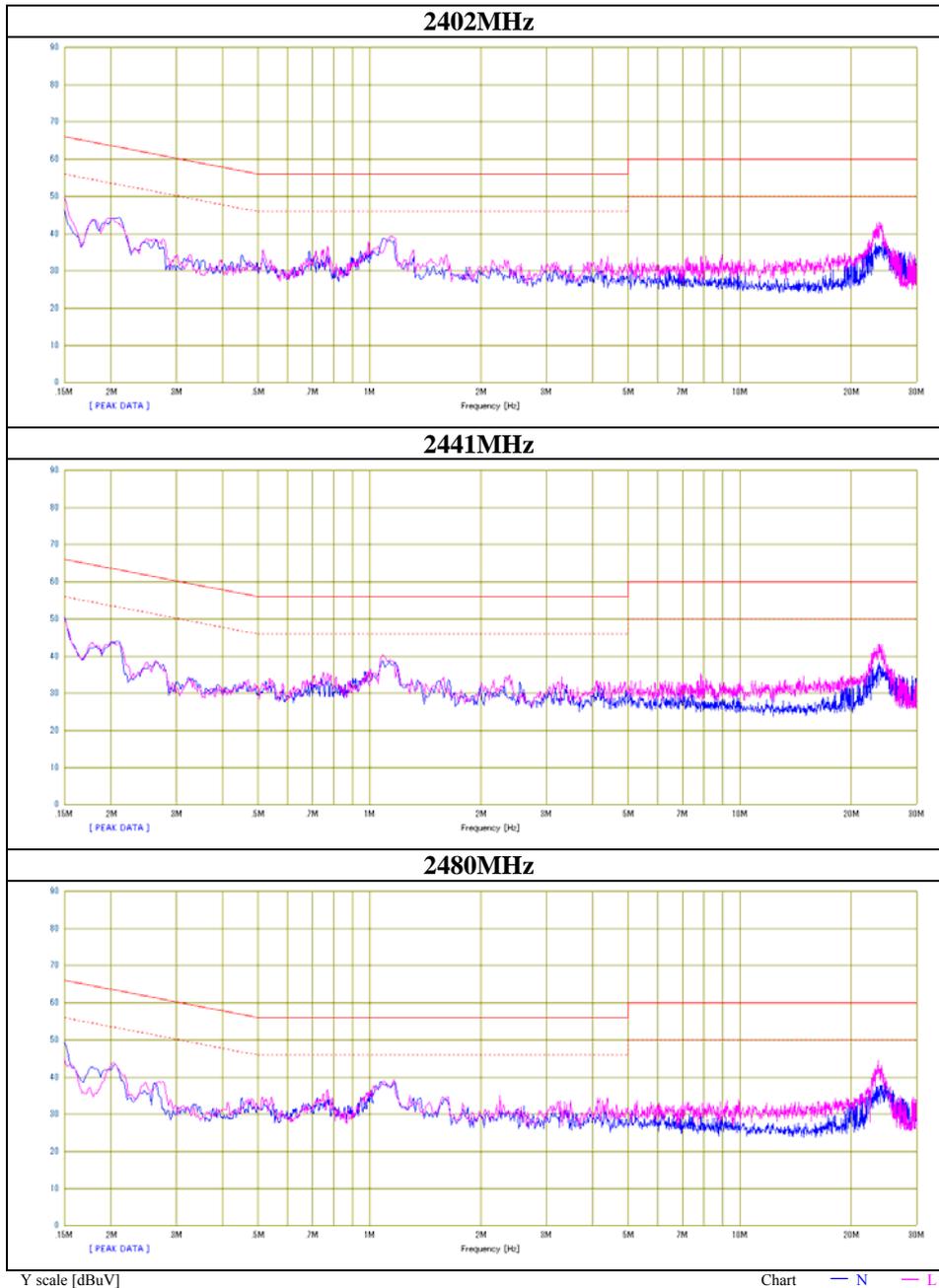


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	21.2	5.9	13.1	34.3	19.0	66.0	56.0	31.7	37.0	N	
0.19721	26.1	8.1	13.1	39.2	21.2	63.7	53.7	24.5	32.5	N	
0.26538	19.1	2.6	13.2	32.3	15.8	61.3	51.3	29.0	35.5	N	
0.76783	14.1	11.8	13.3	27.4	25.1	56.0	46.0	28.6	20.9	N	
1.13123	18.2	4.4	13.3	31.5	17.7	56.0	46.0	24.5	28.3	N	
24.12187	15.4	1.6	14.9	30.3	16.5	60.0	50.0	29.7	33.5	N	
0.15000	19.3	6.5	13.1	32.4	19.6	66.0	56.0	33.6	36.4	L	
0.19506	26.4	7.6	13.1	39.5	20.7	63.8	53.8	24.3	33.1	L	
0.25988	16.9	2.9	13.2	30.1	16.1	61.4	51.4	31.3	35.3	L	
0.74861	15.6	0.4	13.3	28.9	13.7	56.0	46.0	27.1	32.3	L	
1.12848	19.5	5.5	13.3	32.8	18.8	56.0	46.0	23.2	27.2	L	
23.75125	20.8	5.6	14.9	35.7	20.5	60.0	50.0	24.3	29.5	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (L1SN LOSS + ATTEN 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.	33BE0184-HO-02
Date	01/22/2013
Temperature/ Humidity	24 deg. C / 35% RH
Engineer	Tomohisa Nakagawa
Mode	Tx DH5



Conducted Emission

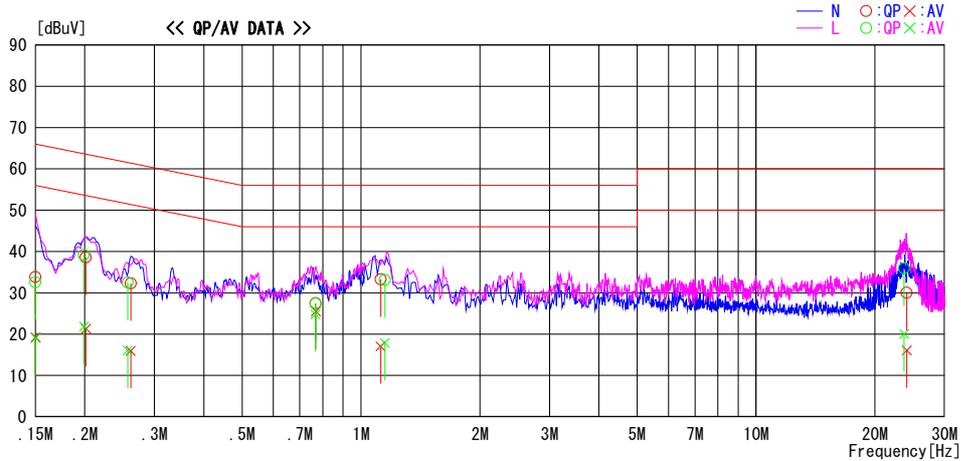
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2013/01/22

Report No. : 33BE0184-HO-02
 Temp./Humi. : 24deg. C / 35% RH
 Engineer : Tomohisa Nakagawa

Mode / Remarks : BT Tx EDR 2441MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

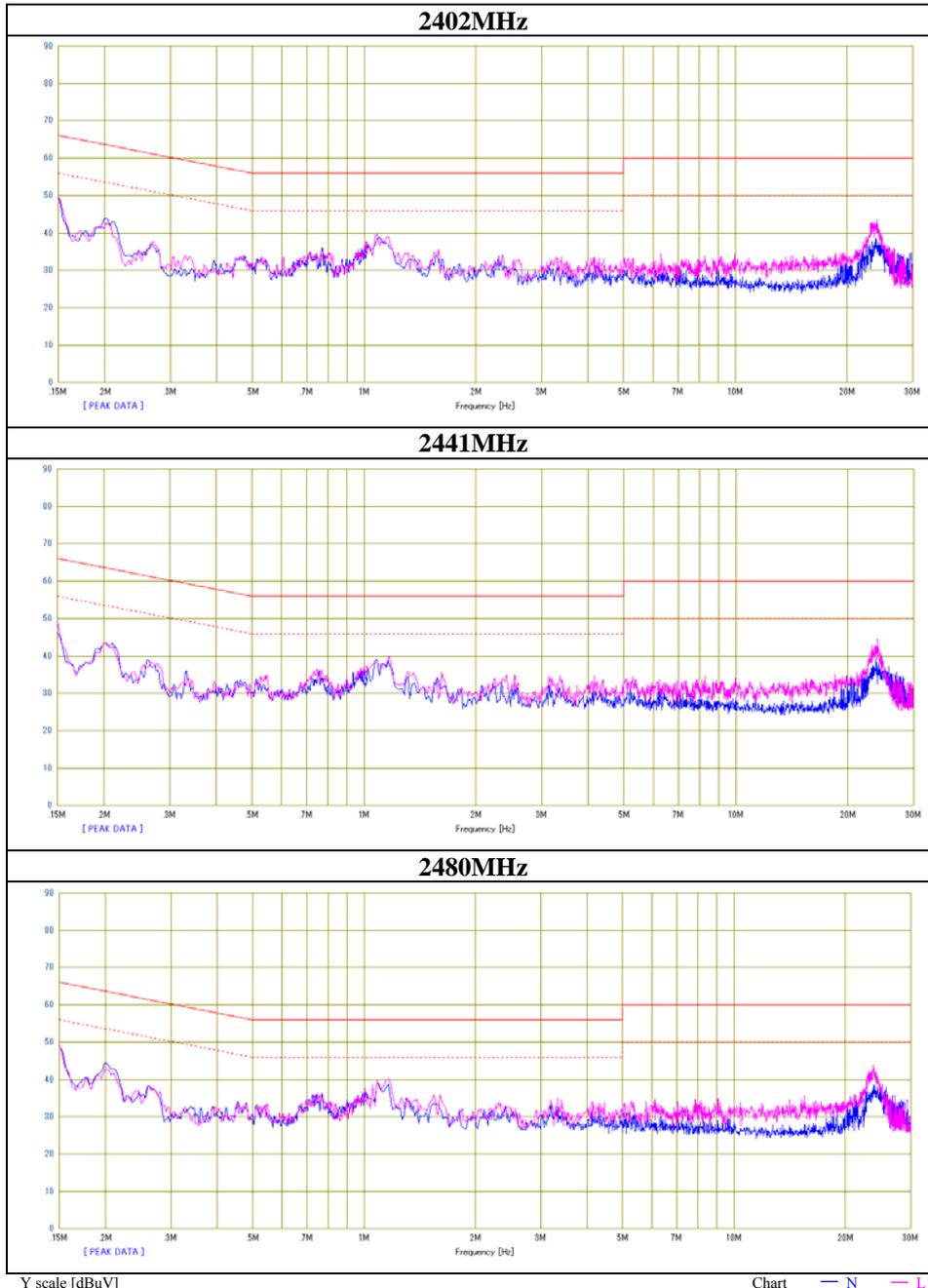


Frequency [MHz]	Reading_Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	20.7	6.1	13.1	33.8	19.2	66.0	56.0	32.2	36.8	N	
0.20115	25.5	8.2	13.1	38.6	21.3	63.6	53.6	25.0	32.3	N	
0.26144	19.1	2.8	13.2	32.3	16.0	61.4	51.4	29.1	35.4	N	
0.76841	14.2	12.2	13.3	27.5	25.5	56.0	46.0	28.5	20.5	N	
1.12118	20.0	3.8	13.3	33.3	17.1	56.0	46.0	22.7	28.9	N	
24.07875	15.1	1.2	14.9	30.0	16.1	60.0	50.0	30.0	33.9	N	
0.15000	19.5	6.0	13.1	32.6	19.1	66.0	56.0	33.4	36.9	L	
0.19903	26.1	8.8	13.1	39.2	21.9	63.7	53.7	24.5	31.8	L	
0.25665	19.3	2.9	13.2	32.5	16.1	61.5	51.5	29.0	35.4	L	
0.76693	14.1	11.5	13.3	27.4	24.8	56.0	46.0	28.6	21.2	L	
1.14863	19.8	4.6	13.3	33.1	17.9	56.0	46.0	22.9	28.1	L	
23.69175	21.0	5.2	14.9	35.9	20.1	60.0	50.0	24.1	29.9	L	

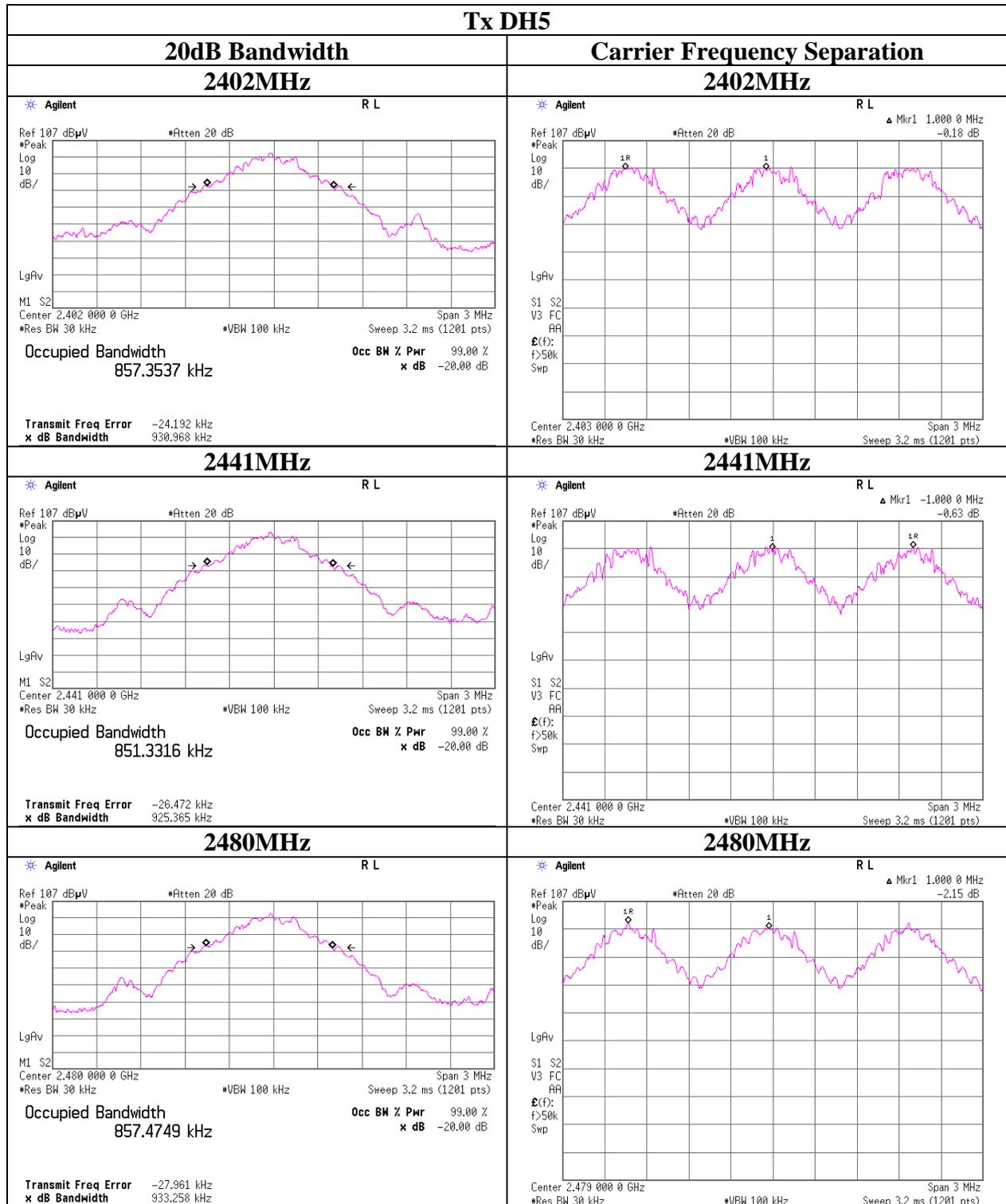
CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.F(LISN LOSS + ATTEN LOSS + CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

Conducted Emission

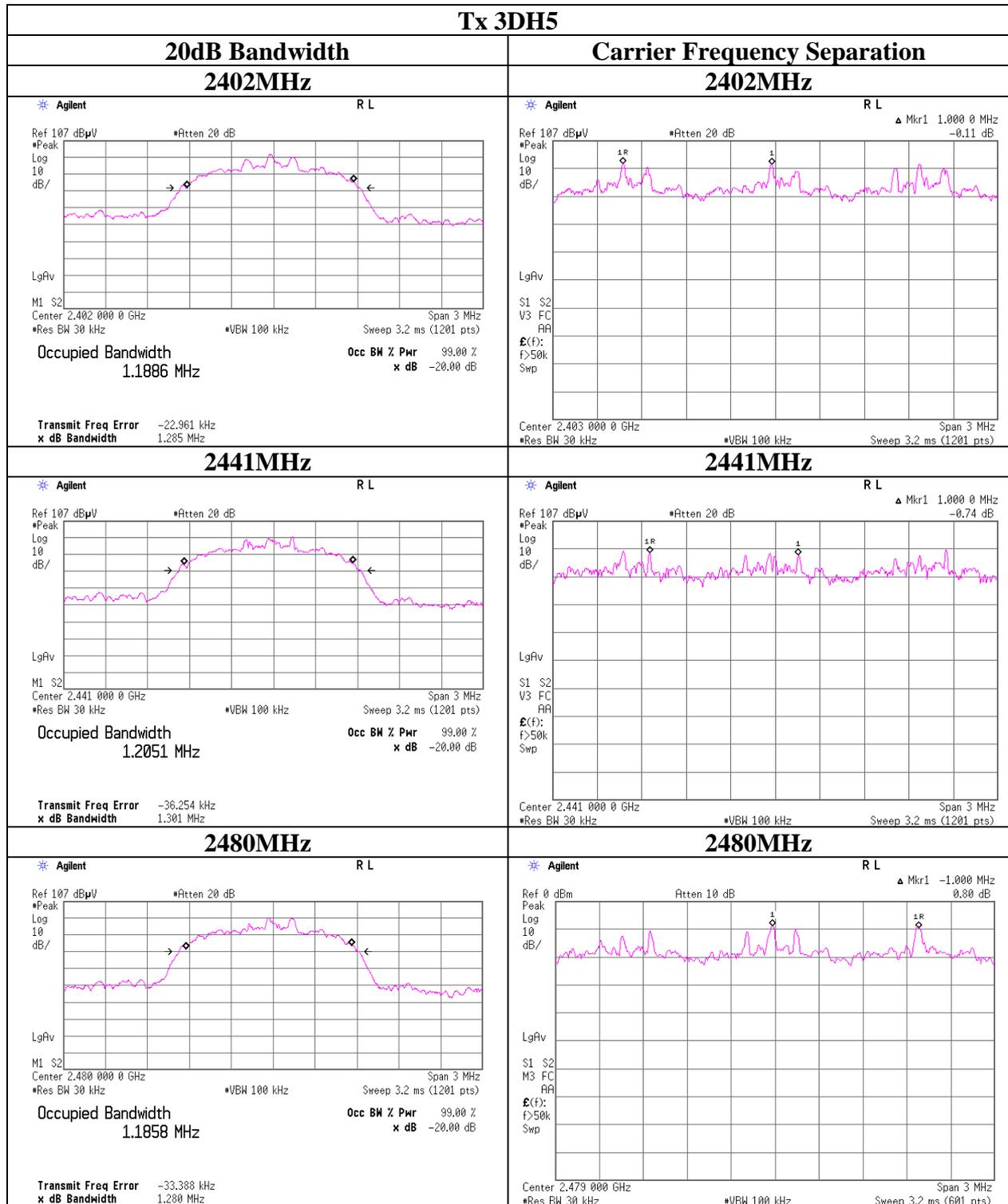
Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	33BE0184-HO-02
Date	01/22/2013
Temperature/ Humidity	24 deg. C / 35% RH
Engineer	Tomohisa Nakagawa
Mode	Tx 3DH5



20dB Bandwidth and Carrier Frequency Separation



20dB Bandwidth and Carrier Frequency Separation



Number of Hopping Frequency

Test place Head Office EMC Lab. No.6 Shielded Room
Report No. 33BE0184-HO-02
Date 10/16/2012
Temperature/ Humidity 25 deg. C / 43% RH
Engineer Tomohisa Nakagawa
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.

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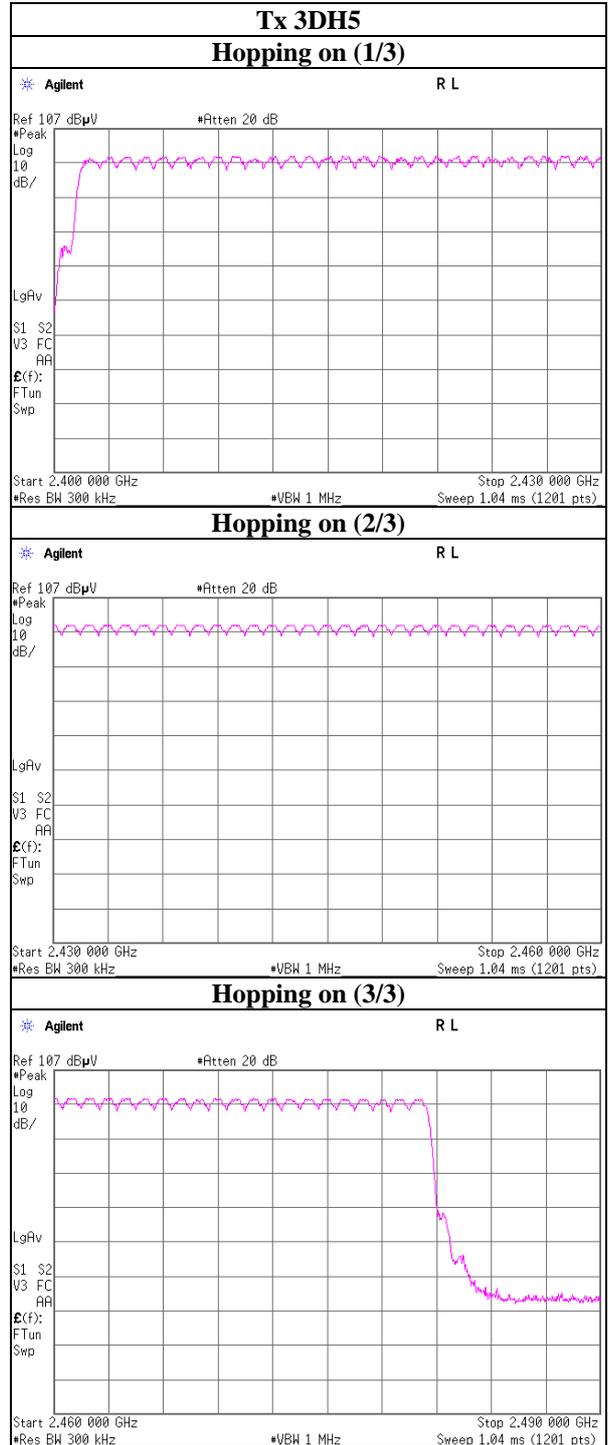
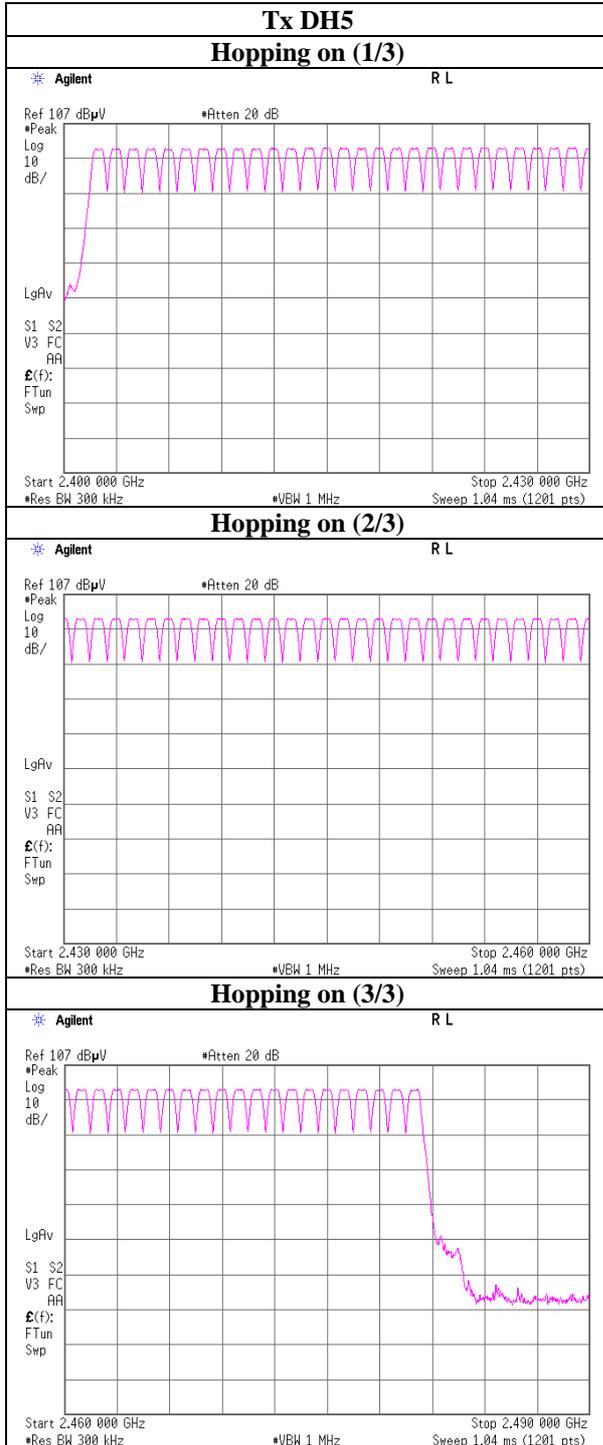
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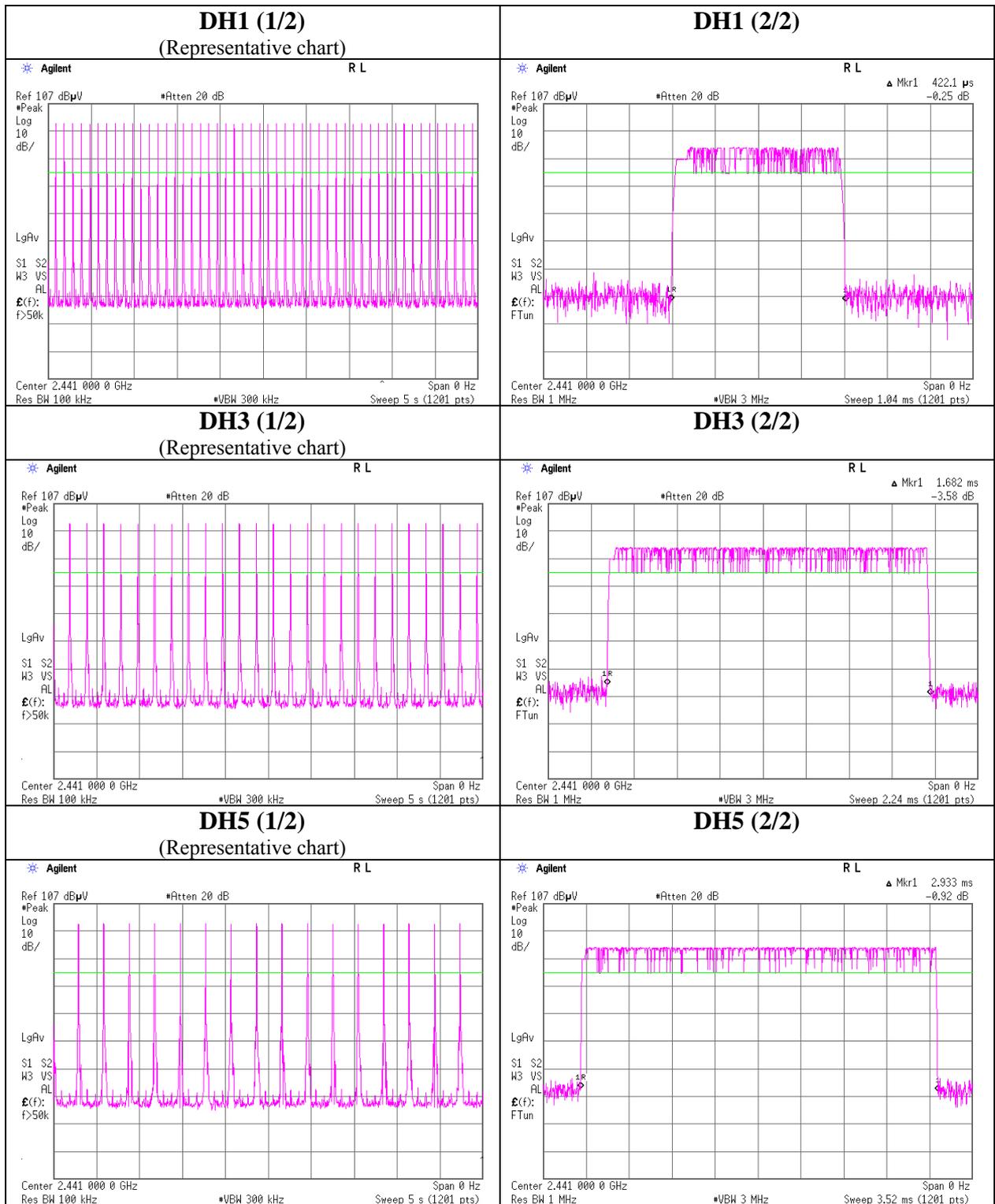
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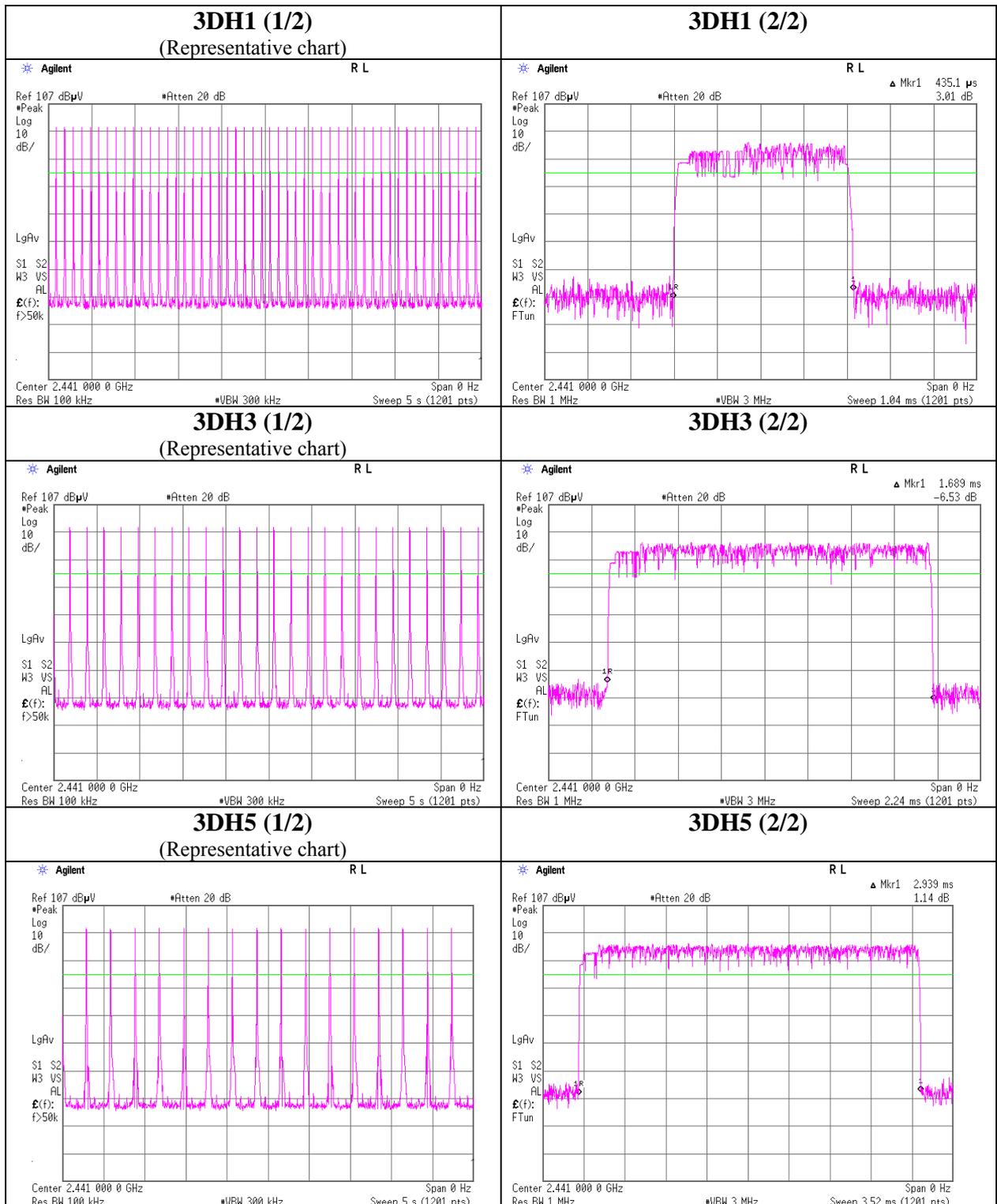
Number of Hopping Frequency



Dwell time



Dwell time



Maximum Peak Output Power

Test place	Head Office EMC Lab. No.6 Shielded Room
Report No.	33BE0184-HO-02
Date	10/16/2012
Temperature/ Humidity	25 deg. C / 43% RH
Engineer	Tomohisa Nakagawa
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	-8.21	0.77	10.03	2.59	1.82	20.96	125	18.37
DH5	2441.0	-8.04	0.77	10.03	2.76	1.89	20.96	125	18.20
DH5	2480.0	-8.21	0.78	10.03	2.60	1.82	20.96	125	18.36
3DH5	2402.0	-10.28	0.77	10.03	0.52	1.13	20.96	125	20.44
3DH5	2441.0	-10.15	0.77	10.03	0.65	1.16	20.96	125	20.31
3DH5	2480.0	-10.19	0.78	10.03	0.62	1.15	20.96	125	20.34

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.

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Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 33BE0184-HO-02
Date : 01/12/2013
Temperature/ Humidity : 22 deg. C / 30% RH
Engineer : Takayuki Shimada
(1-10GHz)
Mode : Tx, DH5 2402MHz

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	97.9	27.4	2.3	32.4	95.2	-	-	Carrier
Hori	2399.500	PK	53.7	27.4	2.3	32.4	51.0	75.2	24.2	
Hori	2400.000	PK	56.3	27.4	2.3	32.4	53.6	75.2	21.6	
Vert	2402.000	PK	103.1	27.4	2.3	32.4	100.4	-	-	Carrier
Vert	2399.500	PK	58.6	27.4	2.3	32.4	55.9	80.4	24.5	
Vert	2400.000	PK	60.9	27.4	2.3	32.4	58.2	80.4	22.2	

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	47.2	31.6	4.1	31.4	-24.6	26.9	53.9	27.0	
Vert	4804.000	AV	53.9	31.6	4.1	31.4	-24.6	33.6	53.9	20.3	

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).

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

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Radiated Spurious Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 33BE0184-HO-02
Date : 01/12/2013
Temperature/ Humidity : 22 deg. C / 31% RH
Engineer : Takayuki Shimada
(1-10GHz)
Mode : Tx, DH5 2441MHz

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	46.2	31.9	4.0	31.4	-24.6	26.1	53.9	27.8	
Vert	4882.000	AV	50.6	31.9	4.0	31.4	-24.6	30.5	53.9	23.4	

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).

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

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Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 33BE0184-HO-02
Date 01/12/2013
Temperature/ Humidity 22 deg. C / 30% RH
Engineer Takayuki Shimada
 (1-10GHz)
Mode Tx, DH5 2480MHz

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]
Hori	4960.000	AV	43.4	32.2	4.0	31.4	-24.6	23.6	53.9	30.3
Vert	4960.000	AV	50.3	32.2	4.0	31.4	-24.6	30.5	53.9	23.4

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).

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

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Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 33BE0184-HO-02
Date : 01/12/2013
Temperature/ Humidity : 22 deg. C / 30% RH
Engineer : Takayuki Shimada
(1-10GHz)
Mode : Tx, 3DH5 2402MHz

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	94.4	27.4	2.3	32.4	91.7	-	-	Carrier
Hori	2399.485	PK	48.8	27.4	2.3	32.4	46.1	71.7	25.6	
Hori	2400.000	PK	50.9	27.4	2.3	32.4	48.2	71.7	23.5	
Vert	2402.000	PK	102.7	27.4	2.3	32.4	100.0	-	-	Carrier
Vert	2399.485	PK	57.1	27.4	2.3	32.4	54.4	80.0	25.6	
Vert	2400.000	PK	59.4	27.4	2.3	32.4	56.7	80.0	23.3	

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

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Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 33BE0184-HO-02
Date 01/12/2013 01/13/2013
Temperature/ Humidity 22 deg. C / 30% RH 22 deg. C / 32% RH
Engineer Takayuki Shimada Hiroshi Kukita
(1-10GHz) (30-1000MHz)
(10-26.5GHz)
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	73.733	QP	35.5	6.5	7.8	32.1	17.7	40.0	22.3	
Hori	95.966	QP	35.4	9.3	8.1	32.3	20.5	43.5	23.0	
Hori	117.225	QP	29.8	12.6	8.4	32.3	18.5	43.5	25.0	
Hori	654.790	QP	39.2	19.9	12.3	32.0	39.4	46.0	6.6	
Hori	699.949	QP	39.2	20.3	12.5	32.0	40.0	46.0	6.0	
Hori	745.101	QP	38.3	21.0	12.8	31.7	40.4	46.0	5.6	
Hori	790.031	QP	37.1	21.7	13.0	31.5	40.3	46.0	5.7	
Hori	835.501	QP	36.1	21.9	13.2	31.3	39.9	46.0	6.1	
Hori	4882.000	PK	48.5	31.9	4.0	31.4	53.0	73.9	20.9	
Hori	7323.000	PK	42.6	36.5	4.7	32.5	51.3	73.9	22.6	
Hori	9764.000	PK	42.7	38.3	5.4	33.0	53.4	73.9	20.5	
Hori	4882.000	AV	39.3	31.9	4.0	31.4	43.8	53.9	10.1	
Hori	7323.000	AV	30.2	36.5	4.7	32.5	38.9	53.9	15.0	
Hori	9764.000	AV	30.2	38.3	5.4	33.0	40.9	53.9	13.0	
Vert	73.732	QP	48.7	6.5	7.8	32.1	30.9	40.0	9.1	
Vert	95.966	QP	45.1	9.3	8.1	32.3	30.2	43.5	13.3	
Vert	118.798	QP	43.0	12.8	8.4	32.3	31.9	43.5	11.6	
Vert	654.789	QP	34.1	19.9	12.3	32.0	34.3	46.0	11.7	
Vert	699.948	QP	34.8	20.3	12.5	32.0	35.6	46.0	10.4	
Vert	745.106	QP	31.8	21.0	12.8	31.7	33.9	46.0	12.1	
Vert	790.257	QP	32.0	21.7	13.0	31.5	35.2	46.0	10.8	
Vert	835.416	QP	29.9	21.9	13.2	31.3	33.7	46.0	12.3	
Vert	4882.000	PK	51.2	31.9	4.0	31.4	55.7	73.9	18.2	
Vert	7323.000	PK	42.8	36.5	4.7	32.5	51.5	73.9	22.4	
Vert	9764.000	PK	42.5	38.3	5.4	33.0	53.2	73.9	20.7	
Vert	4882.000	AV	42.7	31.9	4.0	31.4	47.2	53.9	6.7	
Vert	7323.000	AV	30.2	36.5	4.7	32.5	38.9	53.9	15.0	
Vert	9764.000	AV	30.2	38.3	5.4	33.0	40.9	53.9	13.0	

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 $20\log(3.0m/1.0m) = 9.5dB$

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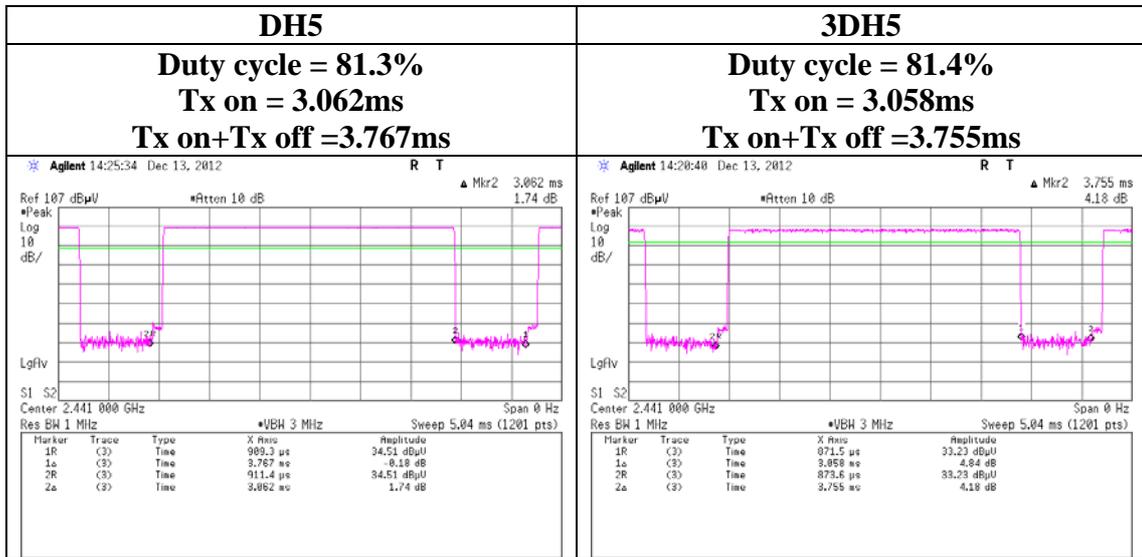
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Duty Cycle confirmation



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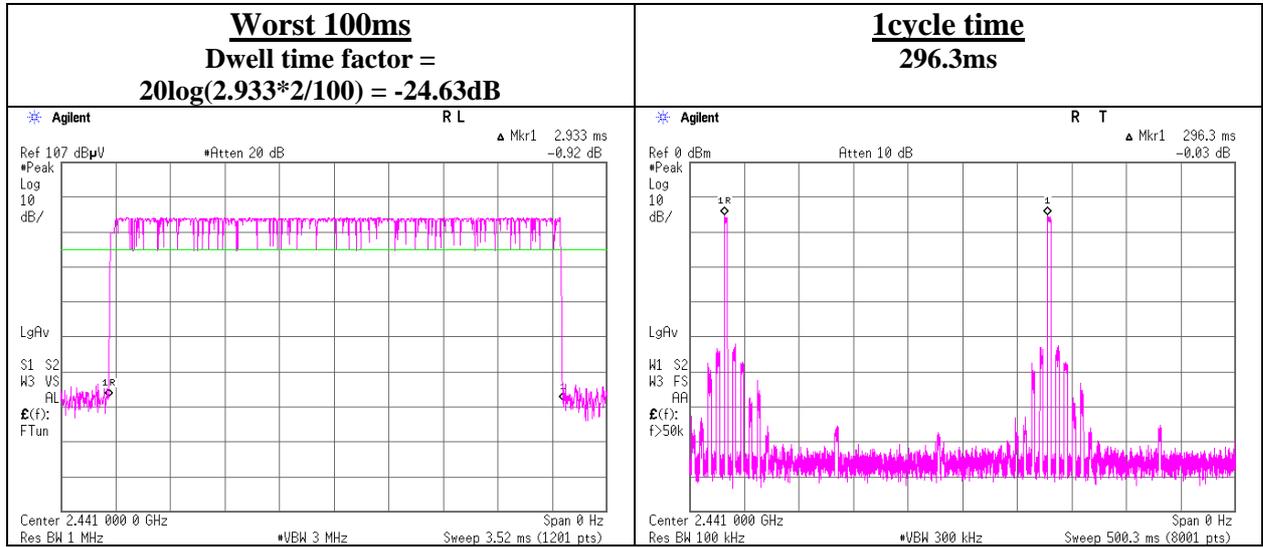
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Dwell time factor

DH5



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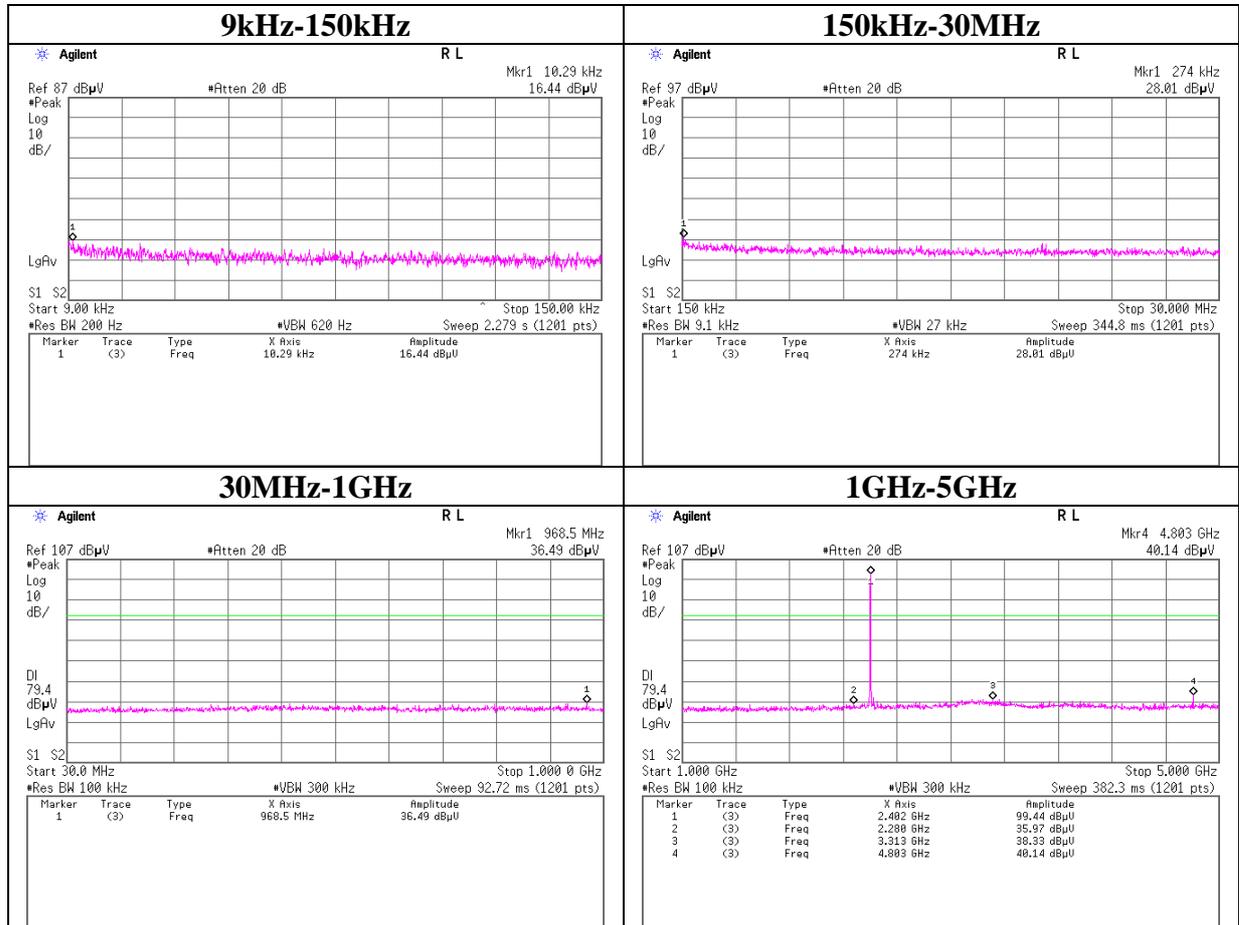
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Conducted Spurious Emission

Tx DH5 2402MHz



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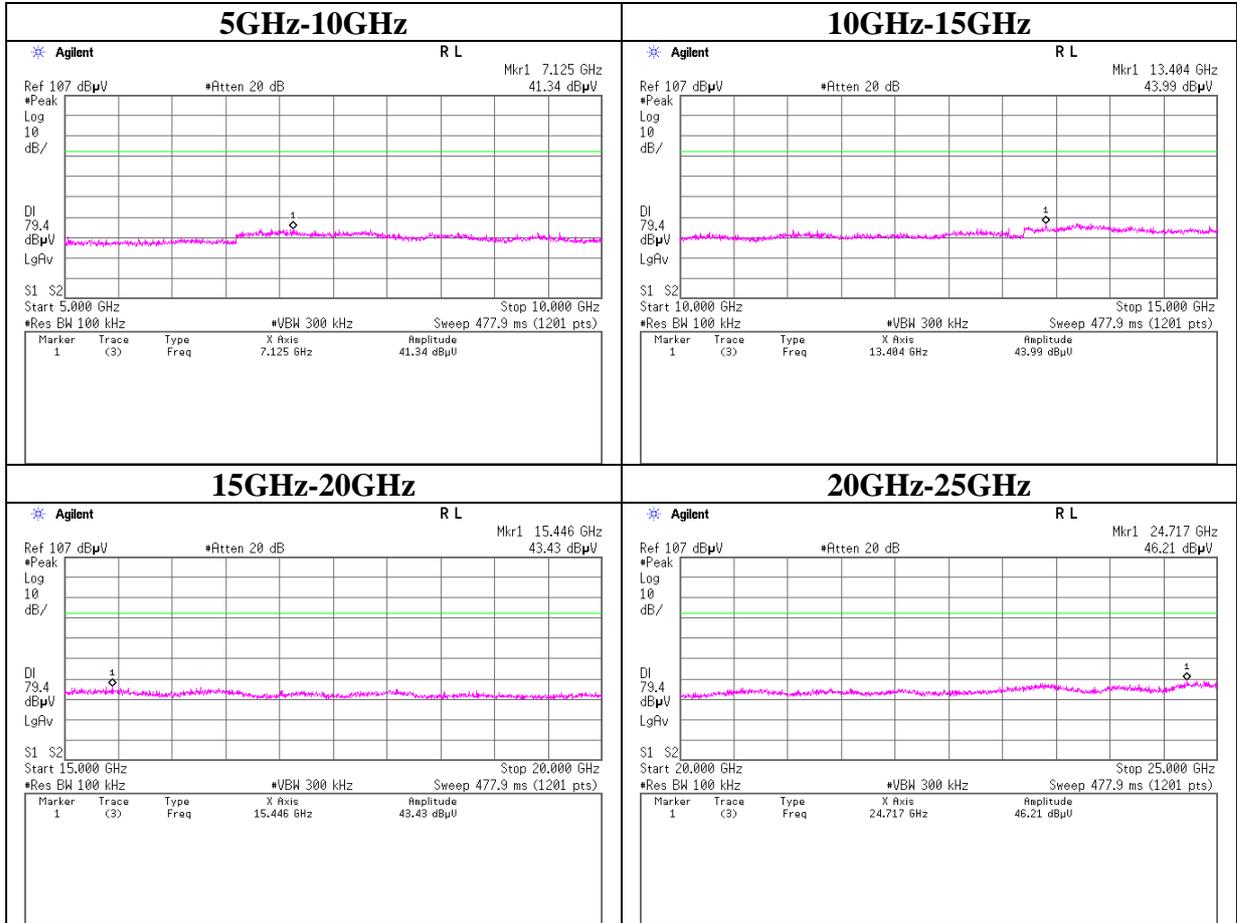
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Conducted Spurious Emission

Tx DH5 2402MHz



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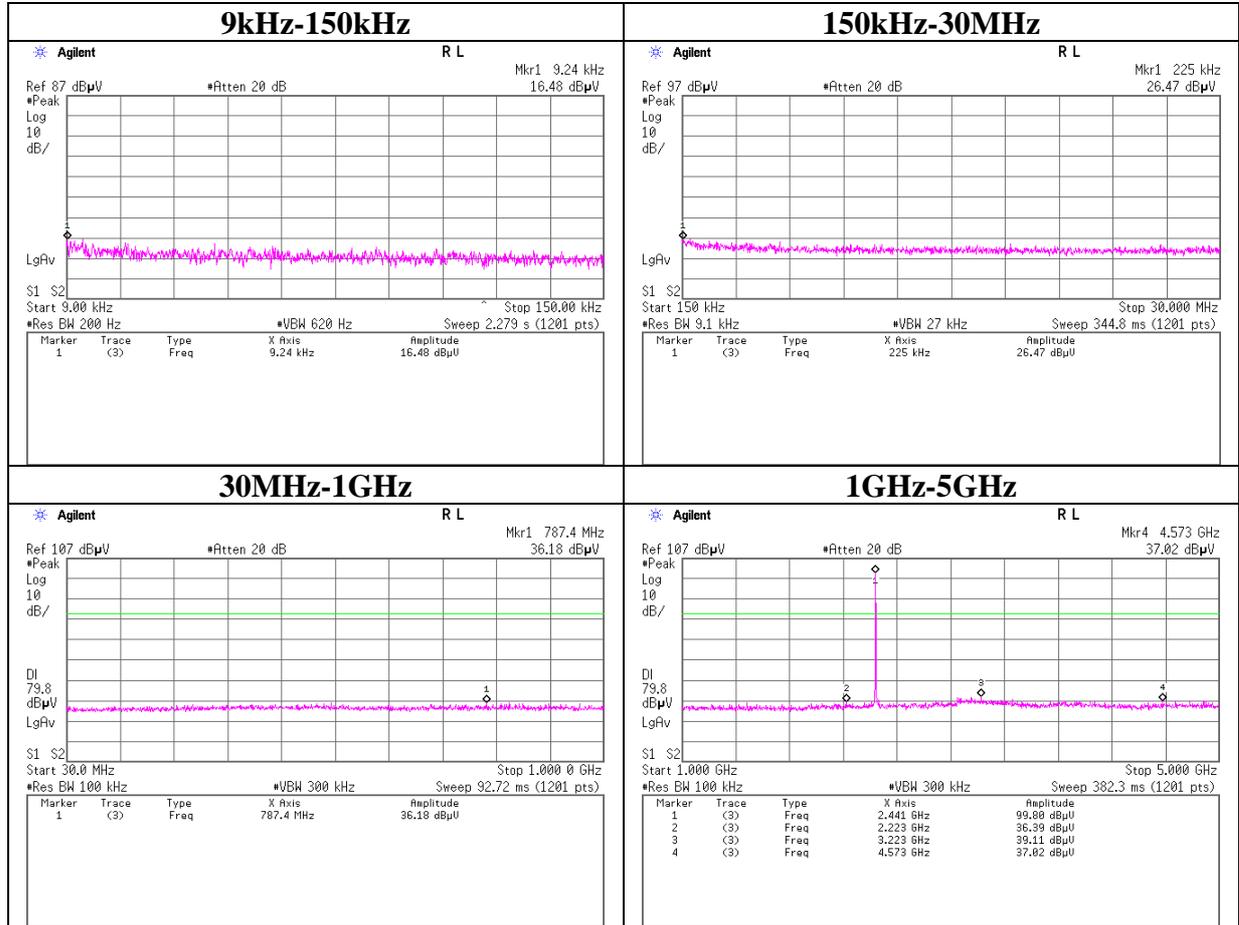
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Conducted Spurious Emission

Tx DH5 2441MHz



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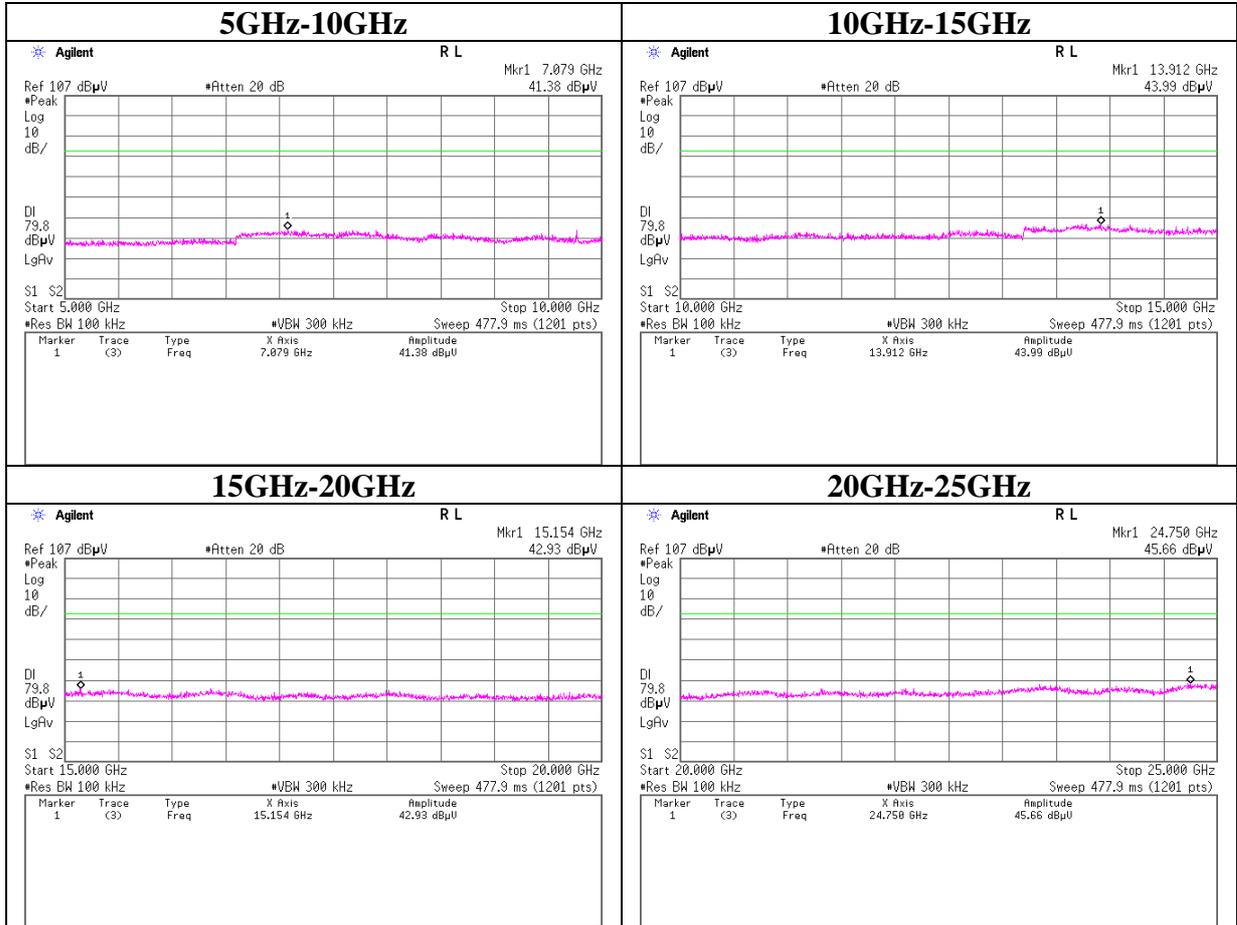
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Conducted Spurious Emission

Tx DH5 2441MHz



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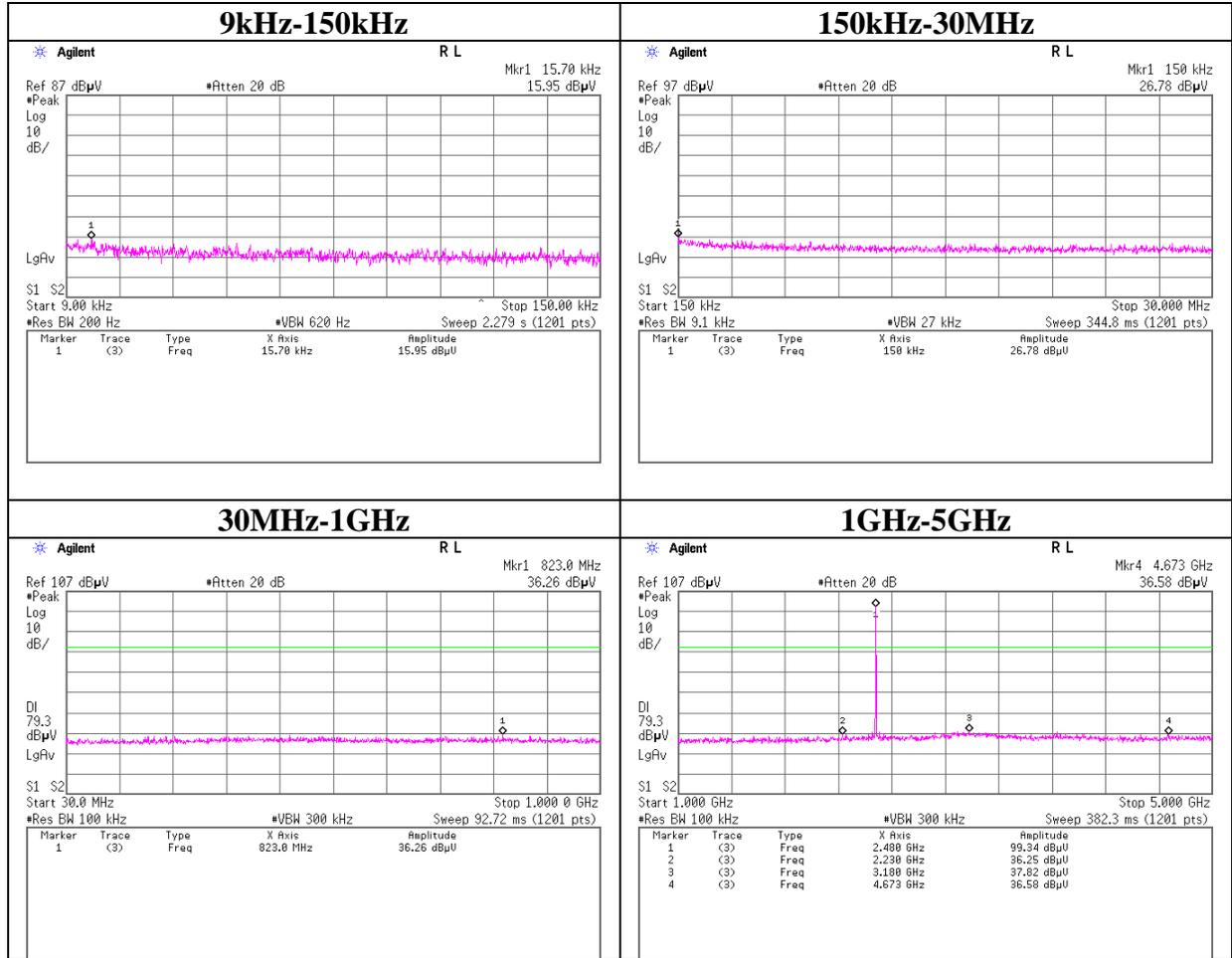
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Conducted Spurious Emission

Tx DH5 2480MHz



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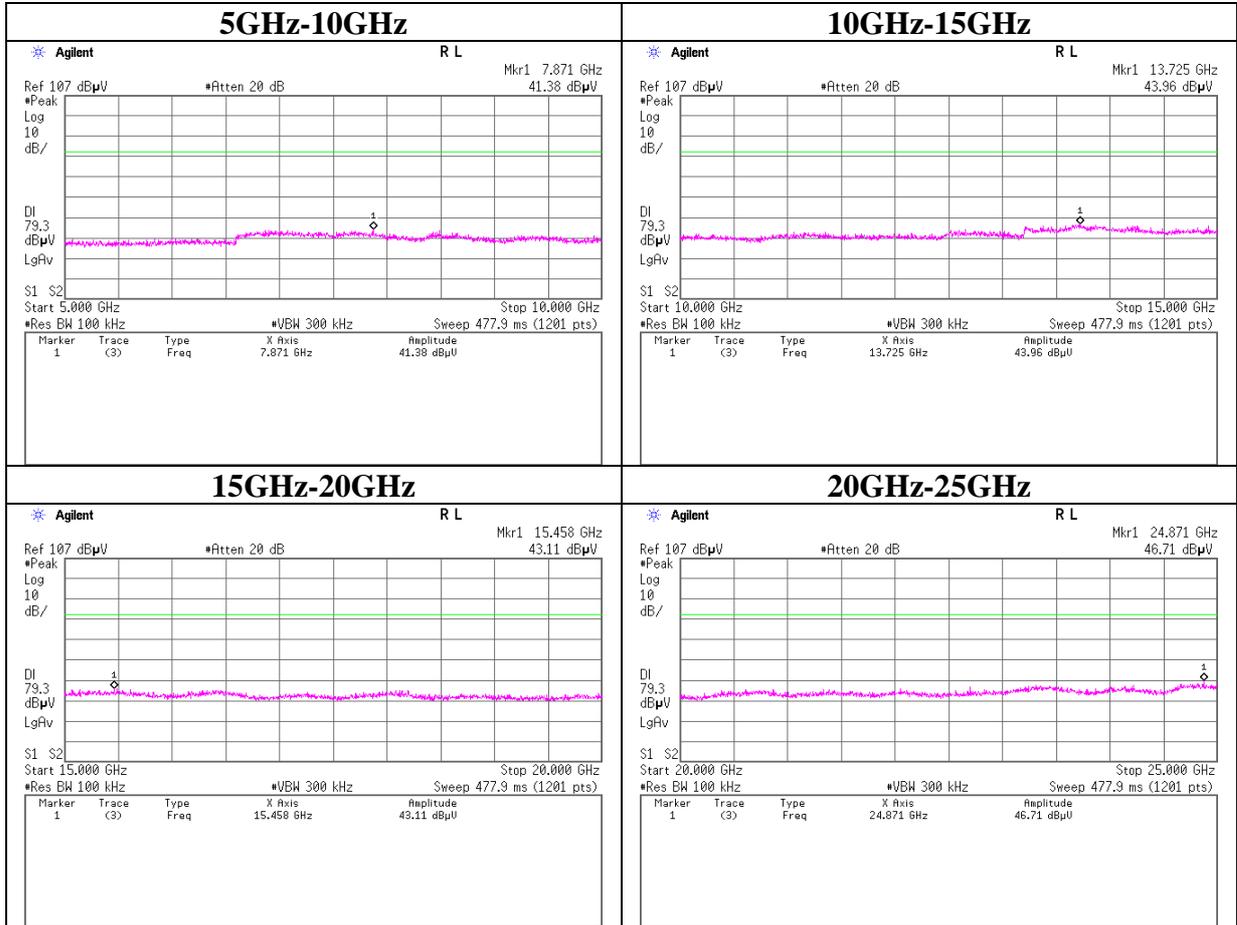
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Conducted Spurious Emission

Tx DH5 2480MHz



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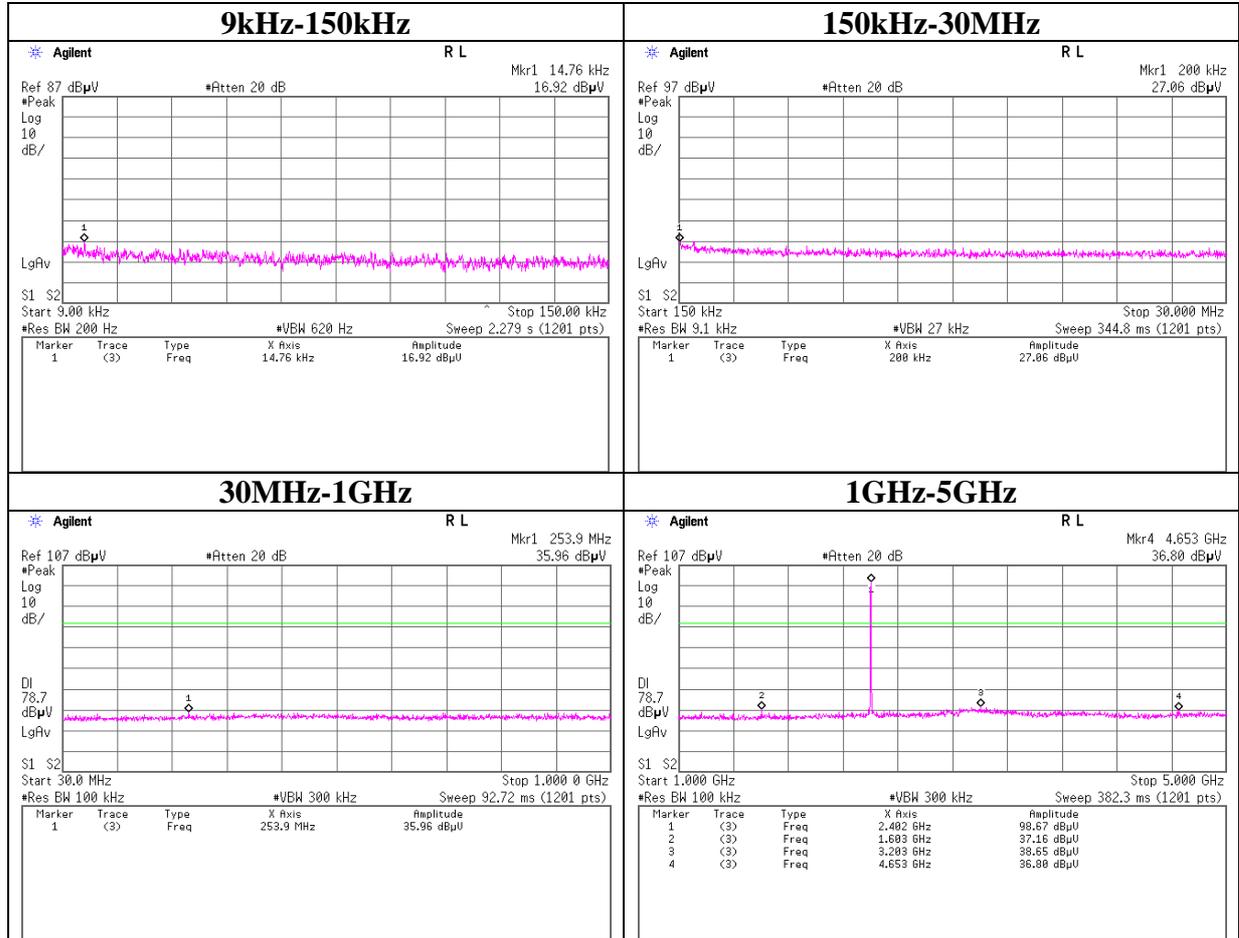
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Conducted Spurious Emission

Tx 3DH5 2402MHz



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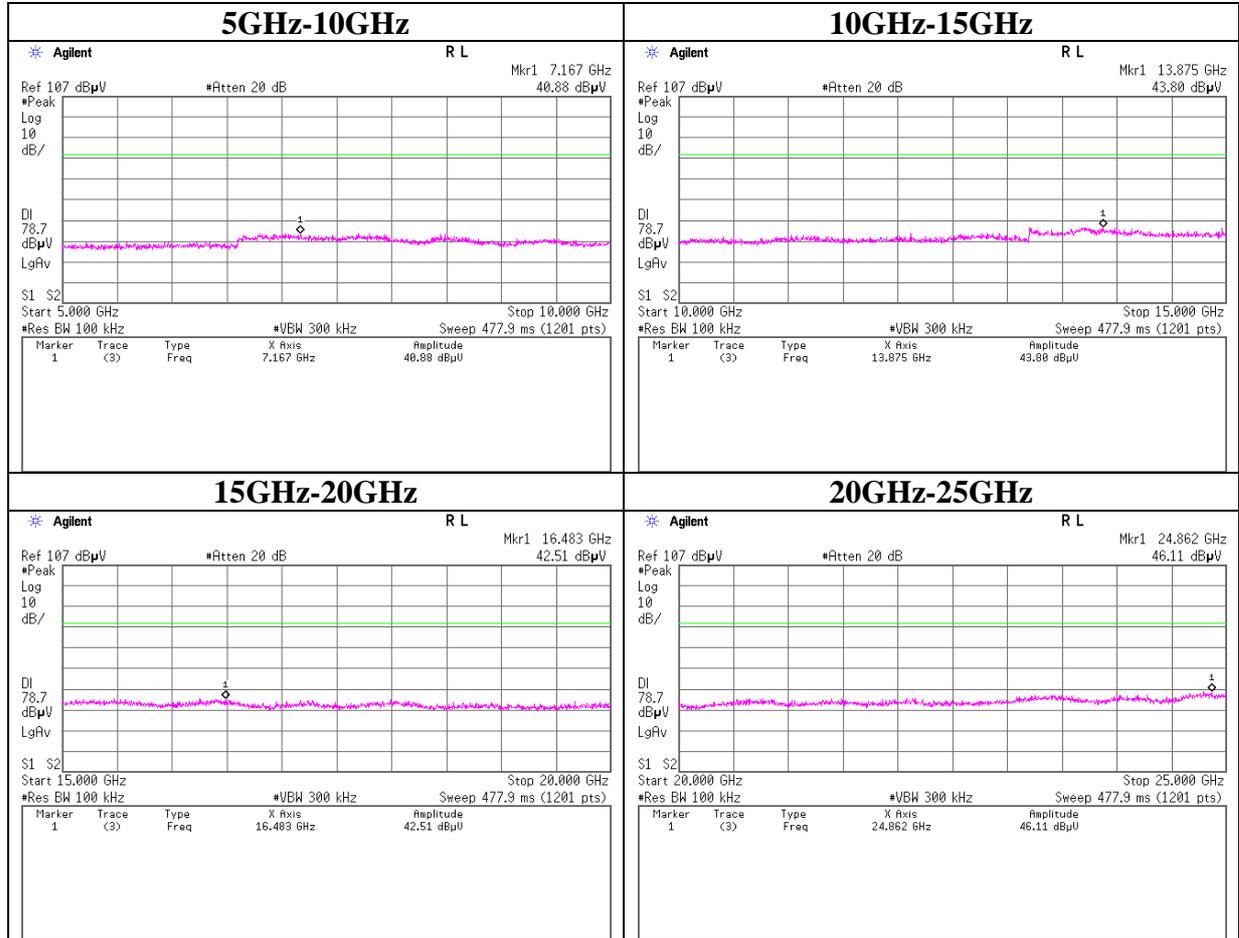
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Conducted Spurious Emission

Tx 3DH5 2402MHz



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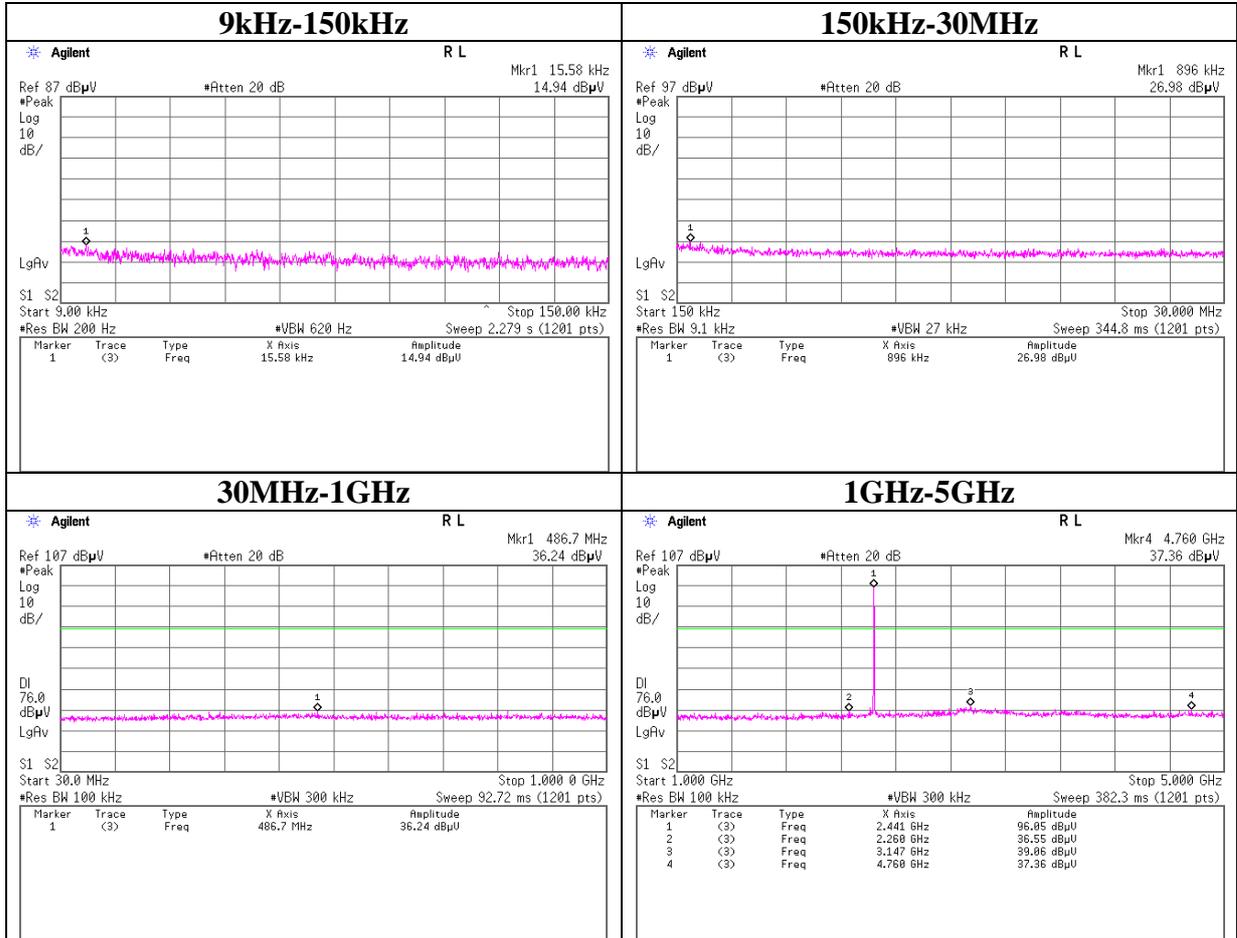
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Conducted Spurious Emission

Tx 3DH5 2441MHz



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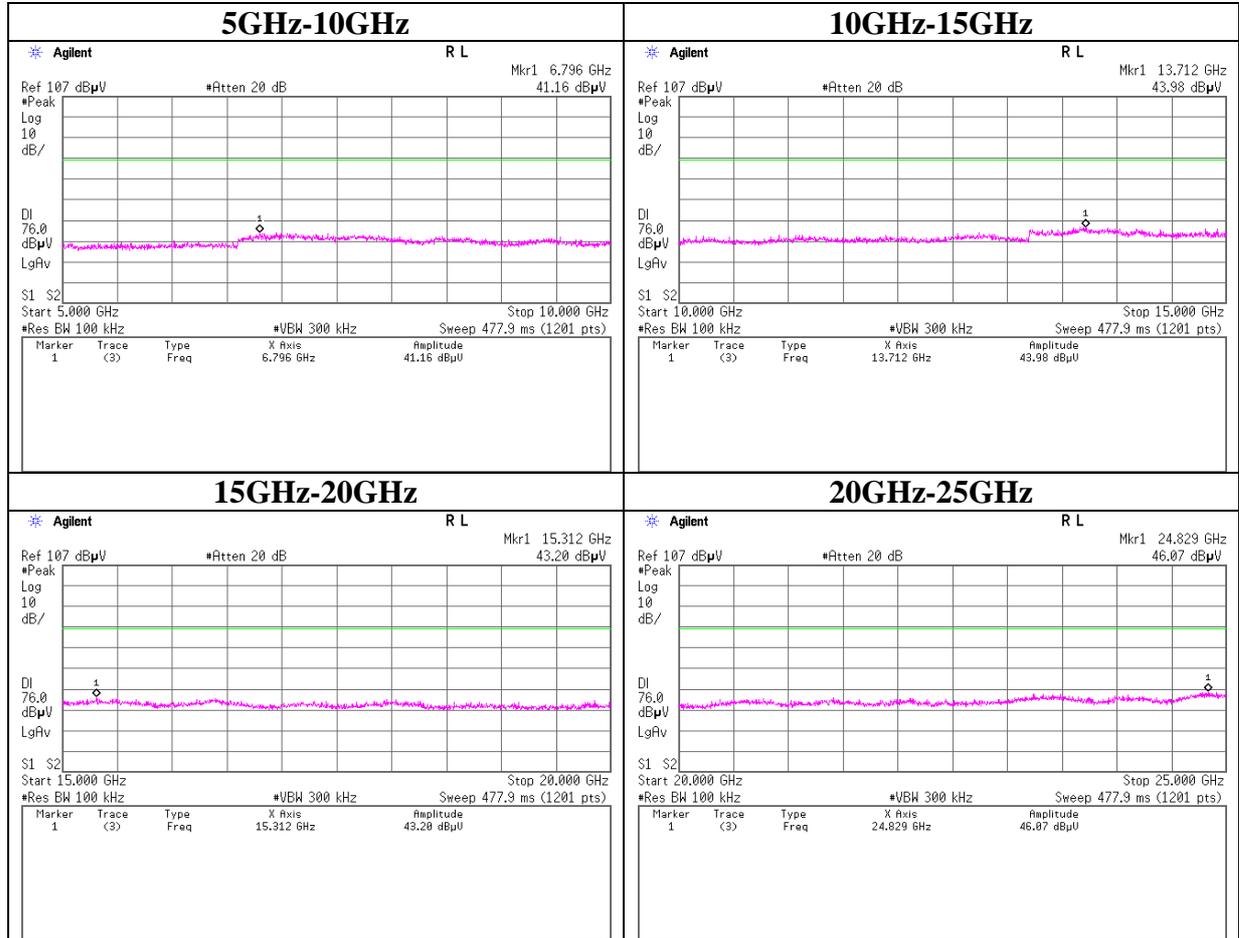
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Conducted Spurious Emission

Tx 3DH5 2441MHz



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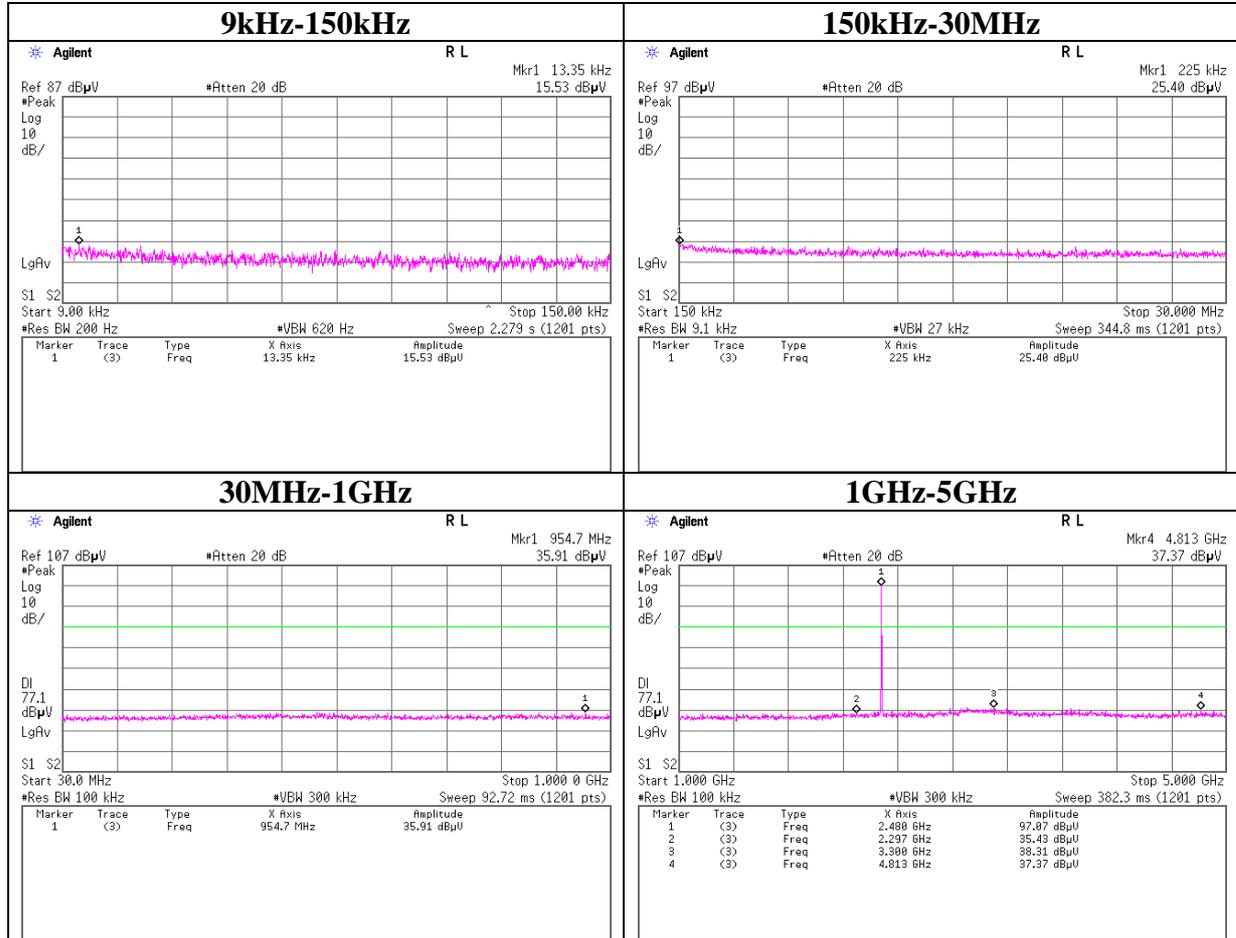
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Conducted Spurious Emission

Tx 3DH5 2480MHz



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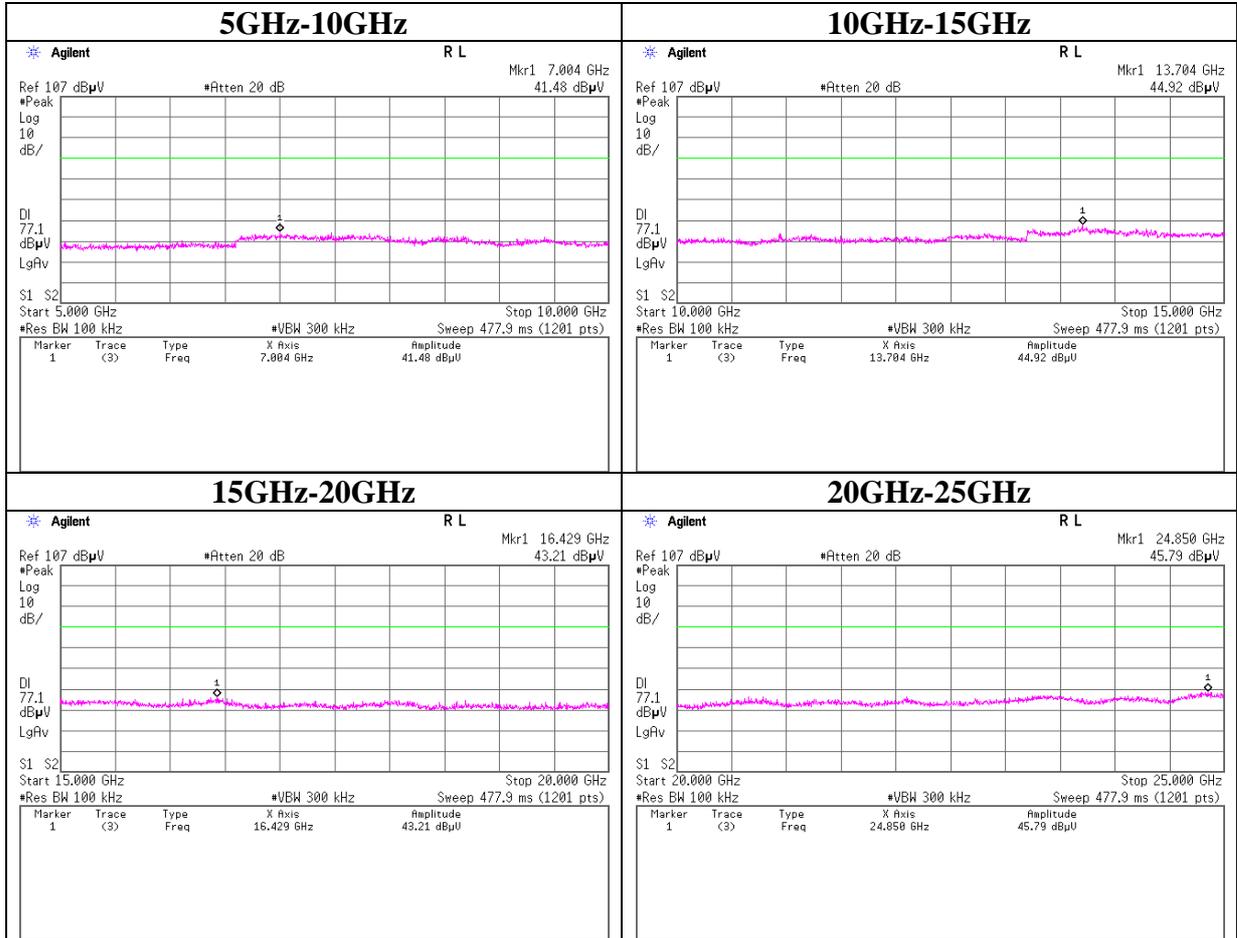
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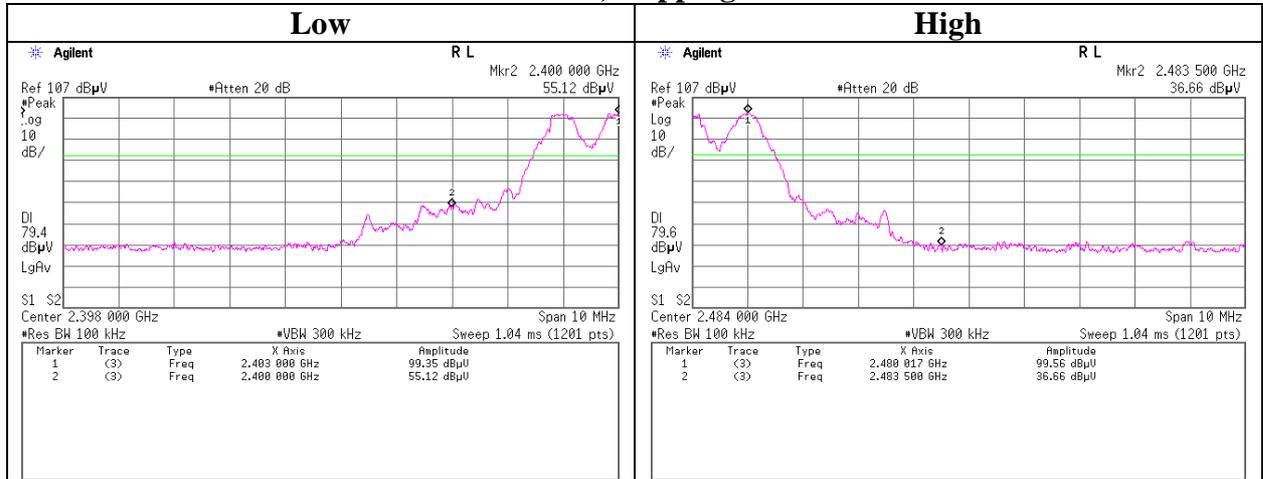
Conducted Spurious Emission

Tx 3DH5 2480MHz

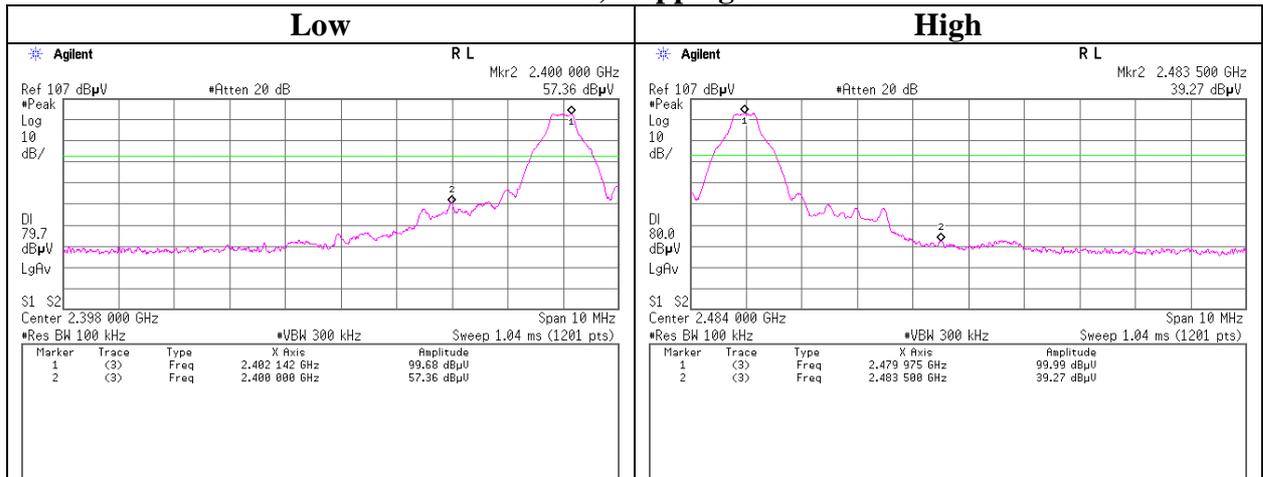


Conducted Emission Band Edge compliance

Tx DH5, Hopping on



Tx DH5, Hopping off



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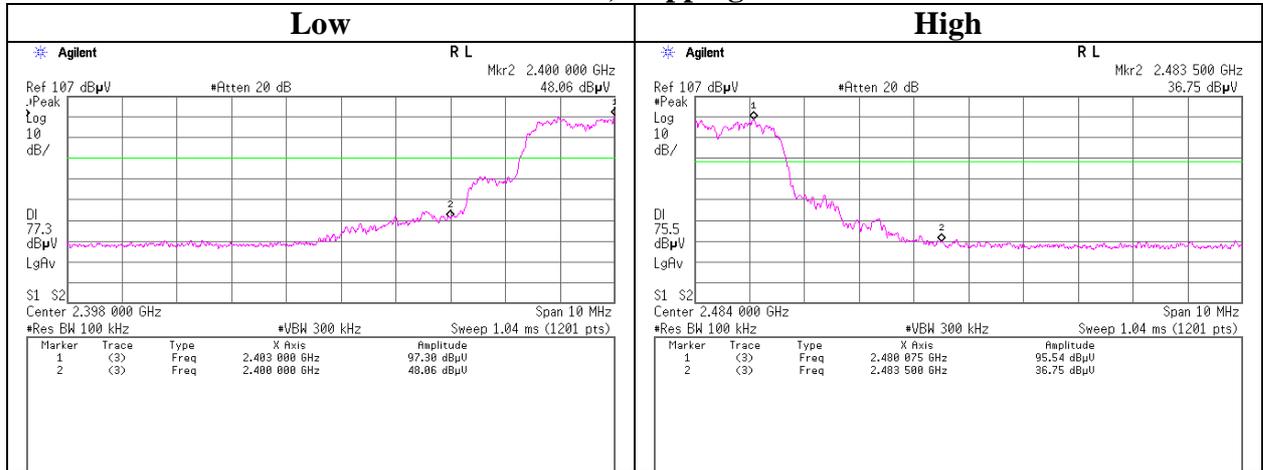
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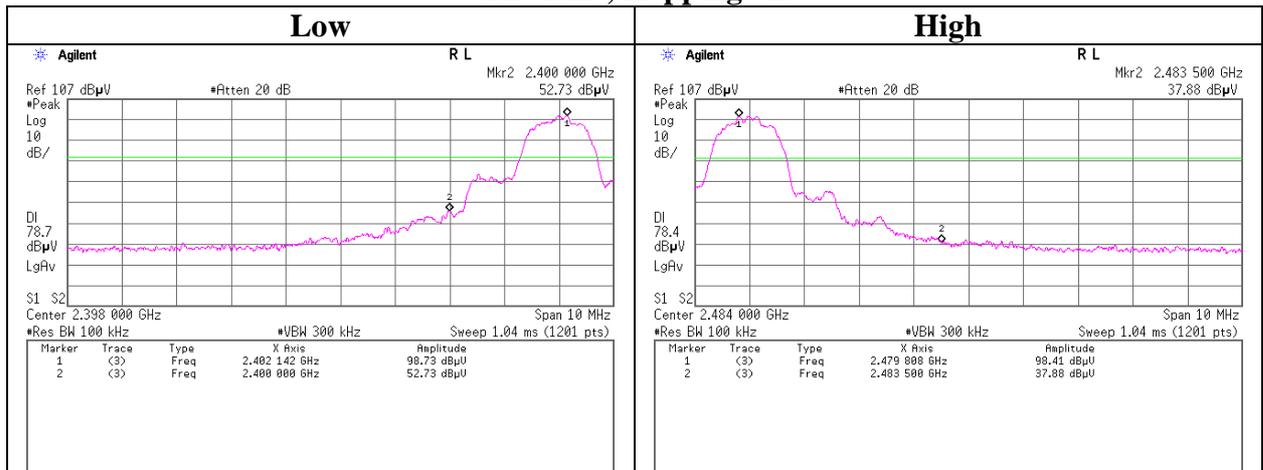
Facsimile : +81 596 24 8124

Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on



Tx 3DH5, Hopping off



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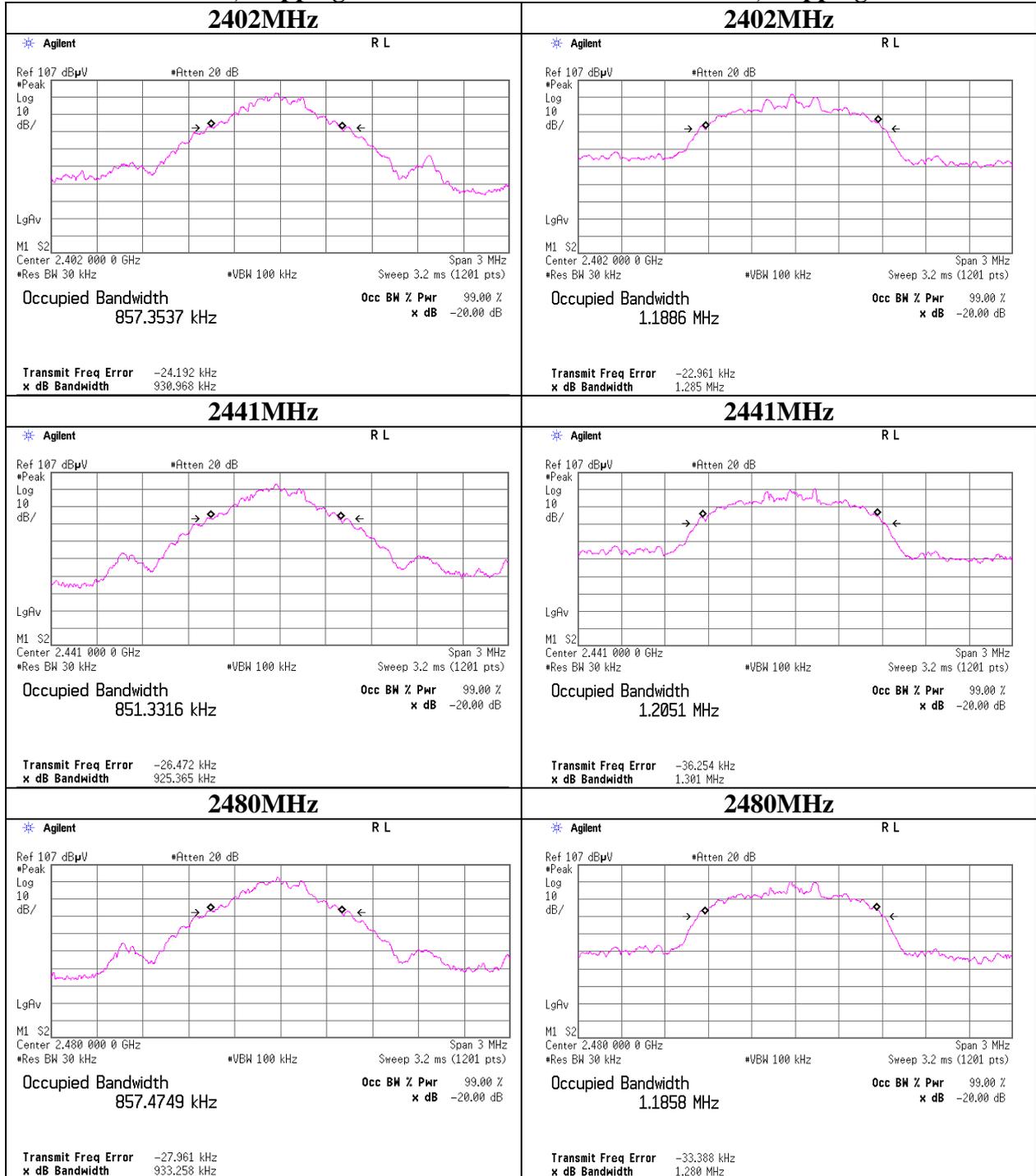
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99%Occupied Bandwidth

Tx DH5, Hopping off

Tx 3DH5, Hopping off



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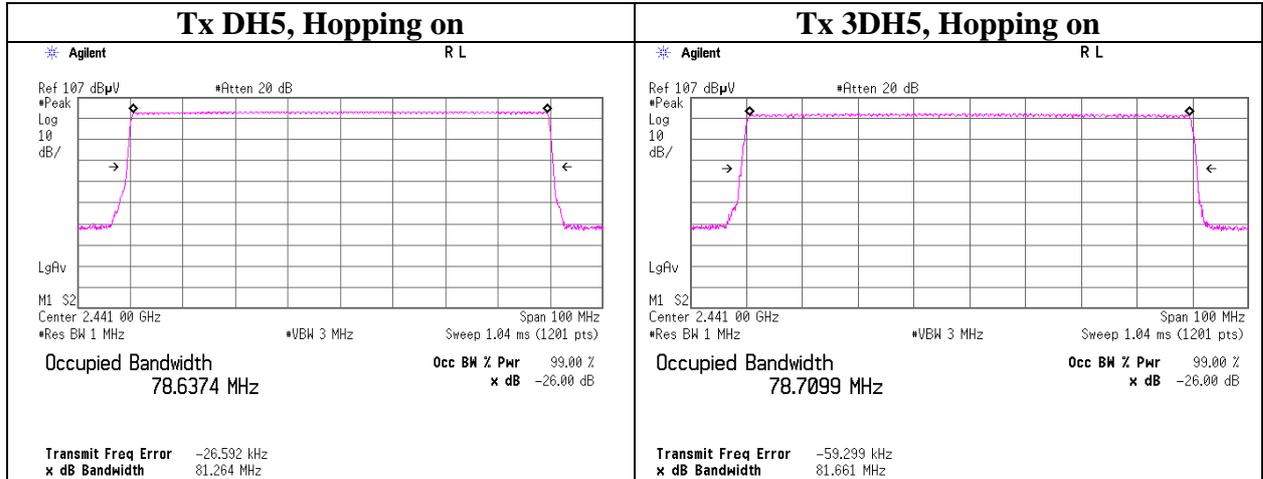
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99% Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2012/02/06 * 12
MBM-11	Barometer	Sunoh	SBR121	839	AT	2010/12/13 * 36
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT/RE	2012/02/03 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2011/11/07 * 12 *1)
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2011/11/07 * 12 *1)
MCC-103	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2012/06/27 * 12
MAT-25	Attenuator(10dB) (above1GHz)	Agilent	8493C	71642	AT	2012/06/27 * 12
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-16	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
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	2012/09/05 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2012/03/29 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2012/08/23 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2012/10/08 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2012/10/08 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2012/07/12 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2012/11/06 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2012/05/21 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2012/11/21 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE	2013/01/07 * 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	2012/07/12 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2013/01/09 * 12

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***1) This test equipment was used for the tests before the expiration date of the calibration.**

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**

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