



RADIO TEST REPORT


Test Report No. : 10037307H-B

Applicant : Hosiden Corporation
Type of Equipment : Bluetooth module
Model No. : ARC0540
FCC ID : VIYARC0540
Test regulation : FCC Part 15 Subpart C: 2013
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.

Date of test: August 27 and 30, 2013

Representative test engineer:


Takayuki Shimada
Engineer of WiSE Japan,
UL Verification Service

Approved by:


Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



NVLAP LAB CODE: 200572-0

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<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 : Hosiden Corporation
Address : 1-4-33, Kitakyuhoji, Yao, Osaka, 5810071, Japan
Telephone Number : +81-72-924-1195
Facsimile Number : +81-72-993-0724
Contact Person : Keiji Mine

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

2.1 Identification of E.U.T.

Type of Equipment : Bluetooth module
Model No. : ARC0540
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 2.0 to DC 3.0V
Receipt Date of Sample : August 4, 2013
Country of Mass-production : China
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

General Specification

Clock frequency(ies) in the system : 16MHz

Radio Specification

[Bluetooth (Ver. 3.0 without EDR function)]

Radio Type : Transceiver
Frequency of Operation : 2402-2480MHz
Modulation : FHSS, GFSK
Power Supply (radio part input) : DC 1.8V
Antenna type : PWB pattern antenna
Antenna Gain : -3dBi

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2013, final revised on June 11, 2013 and effective July 11, 2013

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: 2013, final revised on June 11, 2013 and effective July 11, 2013.

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	N/A *1)	N/A	-
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	9.7dB 9920.00MHz, AV, Vert./Hori.	Complied	Conducted/ Radiated

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

*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

* 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 (DC1.8V) constantly to RF Module regardless of input voltage. 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.

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)	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
0.7dB	1.5dB

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	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

Radiated emission test(3m)

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

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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	-	-	8.8 x 4.6 x 2.8m	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
Spurious Emission (Conducted/Radiated), 20dB Bandwidth, Maximum Peak Output Power	Tx (Hopping off) DH5	2402MHz 2441MHz 2480MHz
Carrier Frequency Separation	Tx (Hopping on) DH5	2402MHz 2441MHz 2480MHz
Number of Hopping Frequency	Tx (Hopping on) DH5	-
Dwell time	Tx (Hopping on), -DH1, DH3, DH5	-
Band Edge Compliance (Conducted)	Tx DH5 -Hopping on -Hopping off	2402MHz 2480MHz
99% Occupied Bandwidth	Tx DH5 -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)</p> <p>*EUT has the power settings by the software as follows; Power settings: 58 Software: Airoha Bluetooth HID LAB Test Tool-Version 1.3.0.3</p> <p>*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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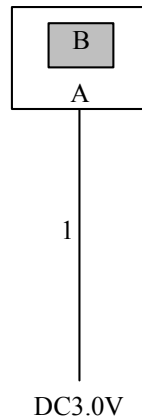
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4.2 Configuration and peripherals



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

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Active 3D Glasses	TDG-BT400A	2	Sony Corporation	-
B	Bluetooth module	ARC0540	17 for RE 11 for AT	Hosiden Corporation	EUT

RE: Radiated Spurious Emission test

AT: Antenna Terminal Conducted tests

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, 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	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

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

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

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

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

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

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

Measurement range : 30M-25GHz

Test data : APPENDIX

Test result : Pass

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SECTION 6: 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 *1)	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 *2)	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) The measurement was performed with Max Hold since the duty cycle was not 100%.
*2) 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

20dB Bandwidth and Carrier Frequency Separation

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 10037307H
Date 08/27/2013
Temperature/ Humidity 25 deg. C / 54% RH
Engineer Takayuki Shimada
Mode Tx (Hopping on) DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.963	1.000	≥ 0.642
DH5	2441.0	0.961	1.000	≥ 0.641
DH5	2480.0	1.000	1.000	≥ 0.667

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

No limit applies to 20dB Bandwidth.

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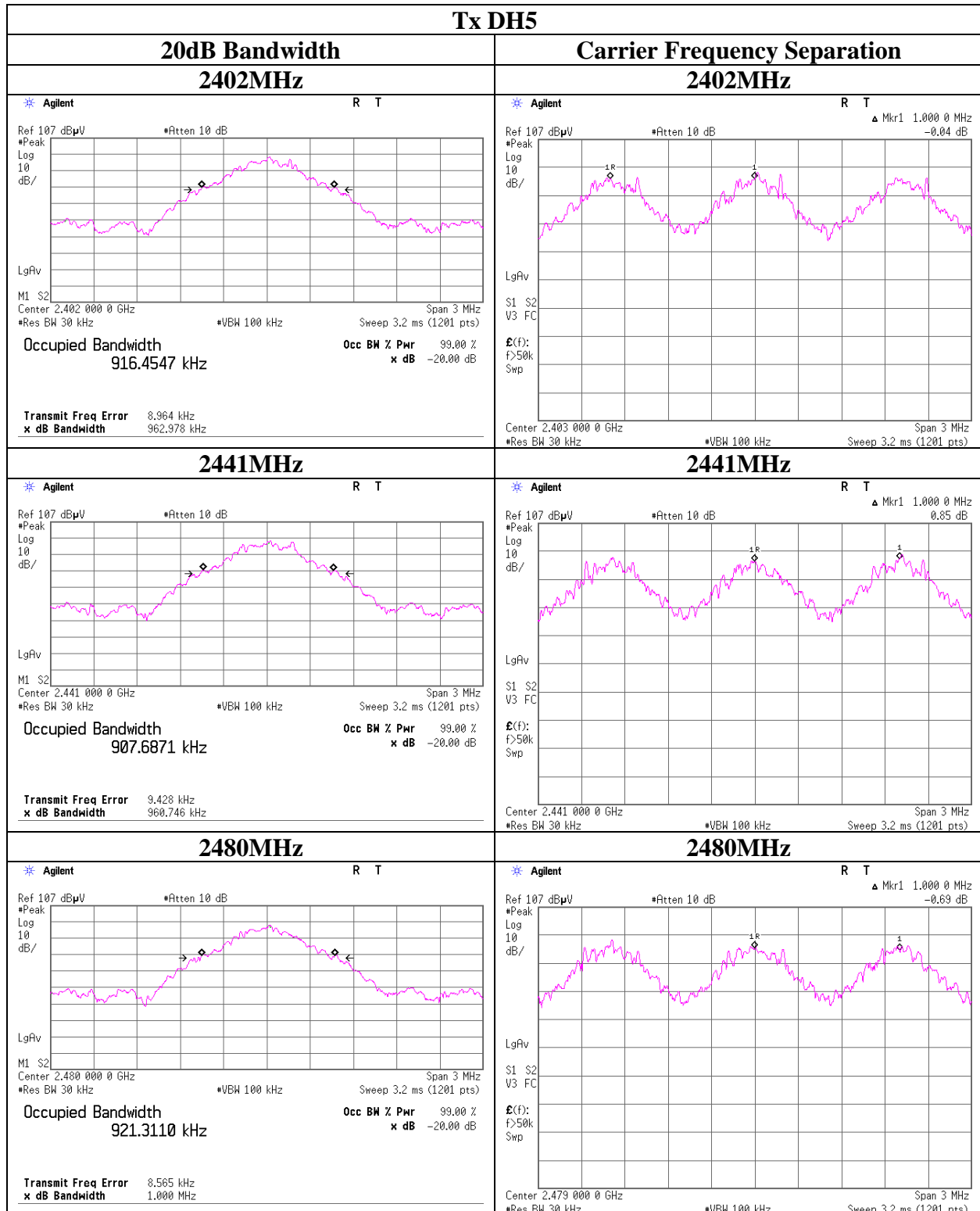
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20dB Bandwidth and Carrier Frequency Separation



Number of Hopping Frequency

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 10037307H
Date 08/27/2013
Temperature/ Humidity 25 deg. C / 54% RH
Engineer Takayuki Shimada
Mode Tx (Hopping on) DH5

Mode	Number of channel [times]	Limit [times]
DH5	79	≥ 15

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

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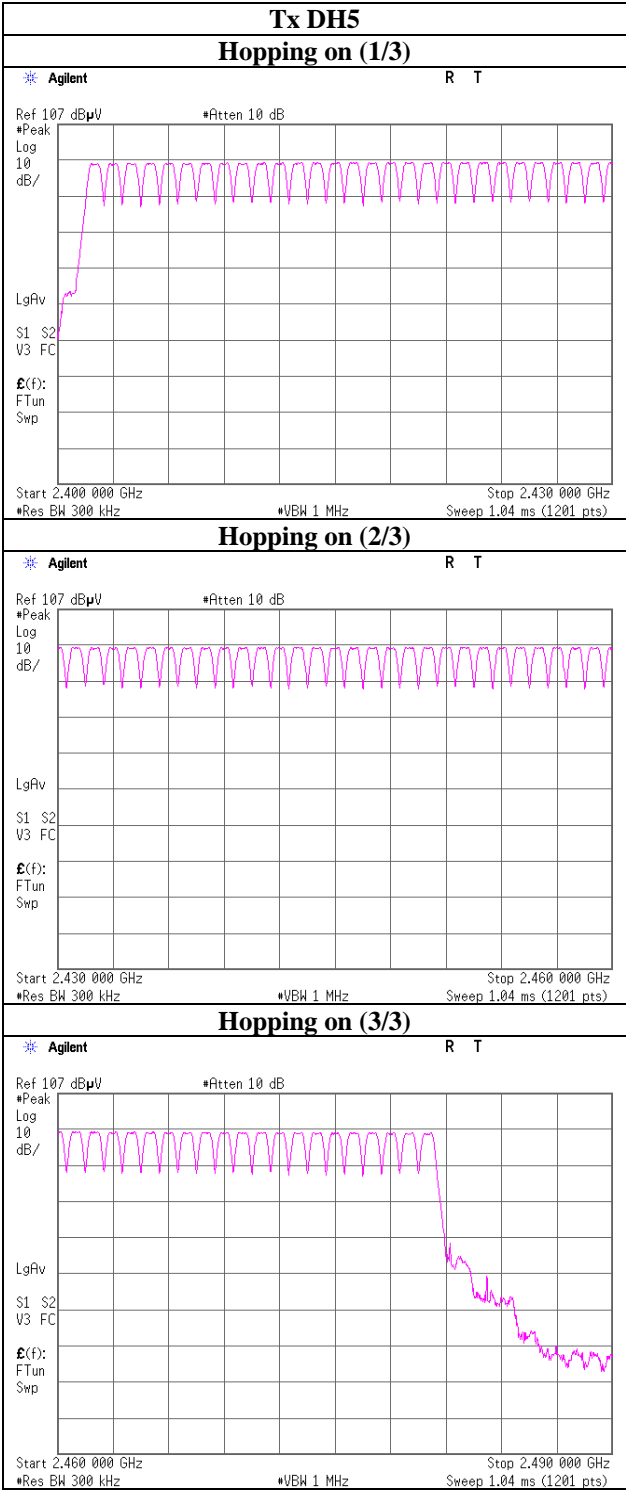
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Number of Hopping Frequency



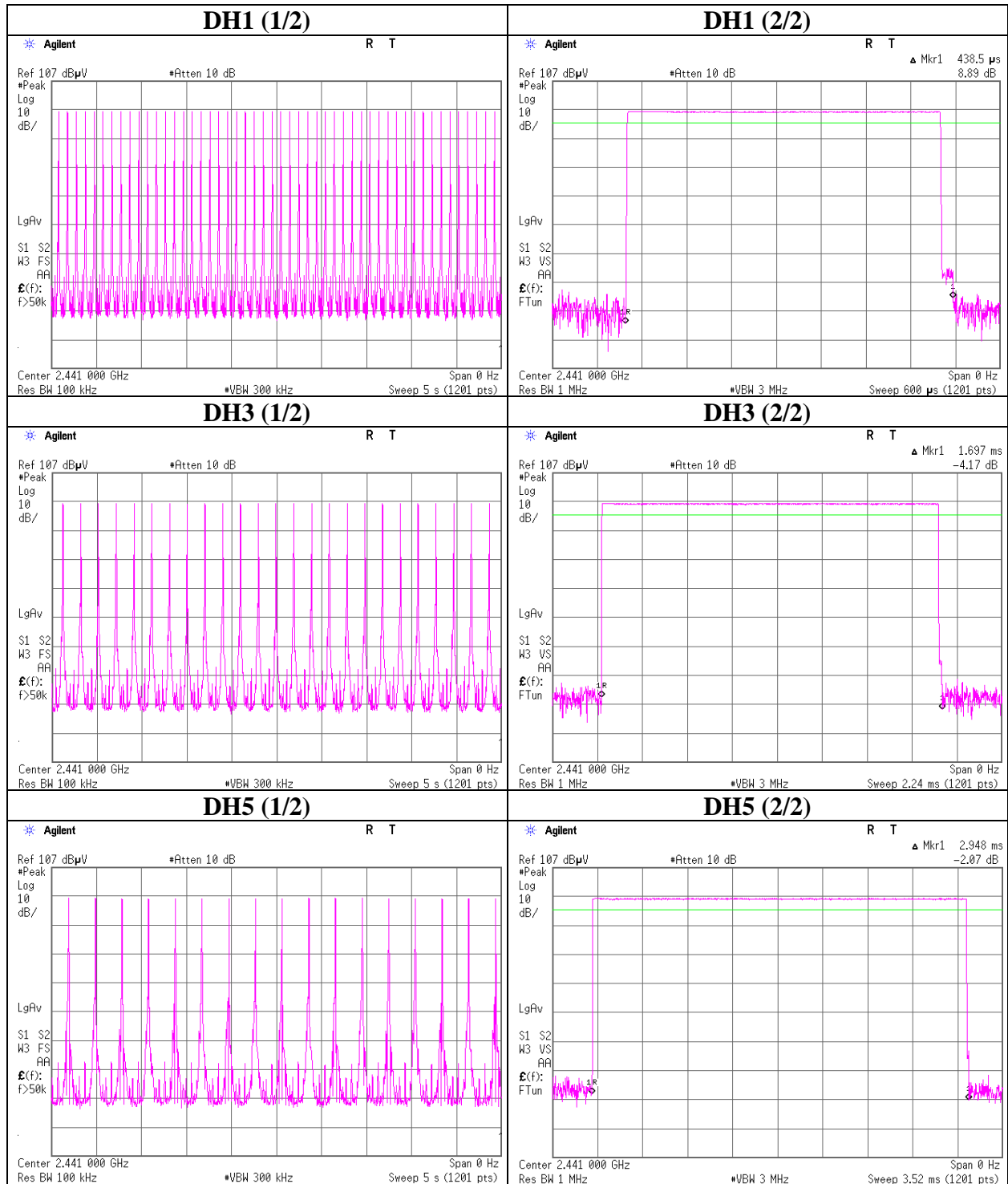
Dwell time

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 10037307H
Date 08/27/2013
Temperature/ Humidity 25 deg. C / 54% RH
Engineer Takayuki Shimada
Mode Tx (Hopping on) DH5

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period				Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.0 times	/	5 sec.	x 31.6 sec. = 316 times	0.439	139	400
DH3	25.0 times	/	5 sec.	x 31.6 sec. = 158 times	1.697	268	400
DH5	17.0 times	/	5 sec.	x 31.6 sec. = 108 times	2.948	318	400

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



Maximum Peak Output Power

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 10037307H
Date 08/27/2013
Temperature/ Humidity 25 deg. C / 54% RH
Engineer Takayuki Shimada
Mode Tx (Hopping off) DH5

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-10.76	2.18	10.10	1.52	1.42	20.96	125	19.44
DH5	2441.0	-10.56	2.19	10.10	1.73	1.49	20.96	125	19.23
DH5	2480.0	-10.92	2.20	10.10	1.38	1.37	20.96	125	19.58

Sample Calculation:

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

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

However, the limit level 125mW of AFH mode was used for the test.

Average Output Power **(Reference data for SAR testing)**

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 10037307H
Date 08/27/2013
Temperature/ Humidity 25 deg. C / 54% RH
Engineer Takayuki Shimada
Mode Tx (Hopping on) DH5

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result	
					[dBm]	[mW]
DH5	2402.0	-12.20	2.18	10.10	0.08	1.02
DH5	2441.0	-11.98	2.19	10.10	0.31	1.07
DH5	2480.0	-12.30	2.20	10.10	0.00	1.00

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

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Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10037307H
Date : 08/30/2013
Temperature/ Humidity : 26deg.C / 54% RH
Engineer : Takayuki Shimada
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.	168.000	QP	36.4	15.6	8.8	32.1	28.7	43.5	14.8	
Hori.	216.000	QP	38.5	16.9	9.2	32.1	32.5	43.5	11.0	
Hori.	240.000	QP	39.1	17.1	9.4	32.1	33.5	46.0	12.5	
Hori.	288.000	QP	30.3	19.3	9.8	32.0	27.4	46.0	18.6	
Hori.	376.720	QP	36.9	16.7	10.4	32.0	32.0	46.0	14.0	
Hori.	792.000	QP	32.6	21.7	12.7	31.6	35.4	46.0	10.6	
Hori.	2390.000	PK	44.2	28.1	2.3	32.4	42.2	73.9	31.7	
Hori.	4804.000	PK	44.6	30.5	4.8	31.4	48.5	73.9	25.4	
Hori.	7206.000	PK	41.9	35.8	5.6	32.3	51.0	73.9	22.9	
Hori.	9608.000	PK	42.2	39.0	6.4	33.0	54.6	73.9	19.3	
Hori.	2390.000	AV	33.0	28.1	2.3	32.4	31.0	53.9	22.9	
Hori.	4804.000	AV	36.8	30.5	4.8	31.4	40.7	53.9	13.2	
Hori.	7206.000	AV	30.9	35.8	5.6	32.3	40.0	53.9	13.9	
Hori.	9608.000	AV	30.8	39.0	6.4	33.0	43.2	53.9	10.7	
Vert.	168.000	QP	30.9	15.6	8.8	32.1	23.2	43.5	20.3	
Vert.	216.000	QP	34.4	16.9	9.2	32.1	28.4	43.5	15.1	
Vert.	240.000	QP	31.7	17.1	9.4	32.1	26.1	46.0	19.9	
Vert.	288.000	QP	30.3	19.3	9.8	32.0	27.4	46.0	18.6	
Vert.	378.150	QP	35.5	16.7	10.4	32.0	30.6	46.0	15.4	
Vert.	792.000	QP	28.2	21.7	12.7	31.6	31.0	46.0	15.0	
Vert.	2390.000	PK	43.6	28.1	2.3	32.4	41.6	73.9	32.3	
Vert.	4804.000	PK	43.2	30.5	4.8	31.4	47.1	73.9	26.8	
Vert.	7206.000	PK	41.6	35.8	5.6	32.3	50.7	73.9	23.2	
Vert.	9608.000	PK	41.4	39.0	6.4	33.0	53.8	73.9	20.1	
Vert.	2390.000	AV	32.6	28.1	2.3	32.4	30.6	53.9	23.3	
Vert.	4804.000	AV	34.3	30.5	4.8	31.4	38.2	53.9	15.7	
Vert.	7206.000	AV	30.9	35.8	5.6	32.3	40.0	53.9	13.9	
Vert.	9608.000	AV	30.8	39.0	6.4	33.0	43.2	53.9	10.7	

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	95.9	28.2	2.3	32.4	94.0	-	-	Carrier
Hori.	2396.533	PK	49.2	28.2	2.3	32.4	47.3	74.0	26.7	
Hori.	2400.000	PK	45.5	28.2	2.3	32.4	43.6	74.0	30.4	
Vert.	2402.000	PK	94.3	28.2	2.3	32.4	92.4	-	-	Carrier
Vert.	2396.583	PK	47.1	28.2	2.3	32.4	45.2	72.4	27.2	
Vert.	2400.000	PK	44.8	28.2	2.3	32.4	42.9	72.4	29.5	

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. : 10037307H
Date : 08/30/2013
Temperature/ Humidity : 26deg.C / 54% RH
Engineer : Takayuki Shimada
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.	168.000	QP	36.4	15.6	8.8	32.1	28.7	43.5	14.8	
Hori.	216.000	QP	38.6	16.9	9.2	32.1	32.6	43.5	10.9	
Hori.	240.000	QP	39.2	17.1	9.4	32.1	33.6	46.0	12.4	
Hori.	288.000	QP	30.0	19.3	9.8	32.0	27.1	46.0	18.9	
Hori.	376.705	QP	37.0	16.7	10.4	32.0	32.1	46.0	13.9	
Hori.	792.000	QP	32.3	21.7	12.7	31.6	35.1	46.0	10.9	
Hori.	4882.000	PK	43.8	30.6	4.7	31.4	47.7	73.9	26.2	
Hori.	7323.000	PK	43.0	36.0	5.6	32.4	52.2	73.9	21.7	
Hori.	9764.000	PK	41.4	39.4	6.4	33.0	54.2	73.9	19.7	
Hori.	4882.000	AV	35.6	30.6	4.7	31.4	39.5	53.9	14.4	
Hori.	7323.000	AV	30.8	36.0	5.6	32.4	40.0	53.9	13.9	
Hori.	9764.000	AV	30.8	39.4	6.4	33.0	43.6	53.9	10.3	
Vert.	168.000	QP	30.7	15.6	8.8	32.1	23.0	43.5	20.5	
Vert.	216.000	QP	34.4	16.9	9.2	32.1	28.4	43.5	15.1	
Vert.	240.000	QP	31.8	17.1	9.4	32.1	26.2	46.0	19.8	
Vert.	288.000	QP	30.1	19.3	9.8	32.0	27.2	46.0	18.8	
Vert.	376.721	QP	35.5	16.7	10.4	32.0	30.6	46.0	15.4	
Vert.	792.000	QP	28.3	21.7	12.7	31.6	31.1	46.0	14.9	
Vert.	4882.000	PK	43.5	30.6	4.7	31.4	47.4	73.9	26.5	
Vert.	7323.000	PK	42.7	36.0	5.6	32.4	51.9	73.9	22.0	
Vert.	9764.000	PK	42.6	39.4	6.4	33.0	55.4	73.9	18.5	
Vert.	4882.000	AV	35.5	30.6	4.7	31.4	39.4	53.9	14.5	
Vert.	7323.000	AV	30.7	36.0	5.6	32.4	39.9	53.9	14.0	
Vert.	9764.000	AV	30.8	39.4	6.4	33.0	43.6	53.9	10.3	

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 $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$
 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. : 10037307H
Date : 08/30/2013
Temperature/ Humidity : 26deg.C / 54% RH
Engineer : Takayuki Shimada
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.	168.000	QP	36.4	15.6	8.8	32.1	28.7	43.5	14.8	
Hori.	216.000	QP	38.6	16.9	9.2	32.1	32.6	43.5	10.9	
Hori.	240.000	QP	38.8	17.1	9.4	32.1	33.2	46.0	12.8	
Hori.	288.000	QP	30.3	19.3	9.8	32.0	27.4	46.0	18.6	
Hori.	376.724	QP	37.0	16.7	10.4	32.0	32.1	46.0	13.9	
Hori.	792.000	QP	32.4	21.7	12.7	31.6	35.2	46.0	10.8	
Hori.	2483.500	PK	60.7	28.4	2.3	32.3	59.1	73.9	14.8	
Hori.	4960.000	PK	42.8	30.7	4.7	31.4	46.8	73.9	27.1	
Hori.	7440.000	PK	43.2	36.2	5.6	32.4	52.6	73.9	21.3	
Hori.	9920.000	PK	44.1	39.8	6.4	33.1	57.2	73.9	16.7	
Hori.	2483.500	AV	44.2	28.4	2.3	32.3	42.6	53.9	11.3	
Hori.	4960.000	AV	33.9	30.7	4.7	31.4	37.9	53.9	16.0	
Hori.	7440.000	AV	30.8	36.2	5.6	32.4	40.2	53.9	13.7	
Hori.	9920.000	AV	31.1	39.8	6.4	33.1	44.2	53.9	9.7	
Vert.	168.000	QP	30.8	15.6	8.8	32.1	23.1	43.5	20.4	
Vert.	216.000	QP	34.4	16.9	9.2	32.1	28.4	43.5	15.1	
Vert.	240.000	QP	31.7	17.1	9.4	32.1	26.1	46.0	19.9	
Vert.	288.000	QP	30.5	19.3	9.8	32.0	27.6	46.0	18.4	
Vert.	378.110	QP	35.6	16.7	10.4	32.0	30.7	46.0	15.3	
Vert.	792.000	QP	28.3	21.7	12.7	31.6	31.1	46.0	14.9	
Vert.	2483.500	PK	47.4	28.4	2.3	32.3	45.8	73.9	28.1	
Vert.	4960.000	PK	42.6	30.7	4.7	31.4	46.6	73.9	27.3	
Vert.	7440.000	PK	42.1	36.2	5.6	32.4	51.5	73.9	22.4	
Vert.	9920.000	PK	42.6	39.8	6.4	33.1	55.7	73.9	18.2	
Vert.	2483.500	AV	41.5	28.4	2.3	32.3	39.9	53.9	14.0	
Vert.	4960.000	AV	32.9	30.7	4.7	31.4	36.9	53.9	17.0	
Vert.	7440.000	AV	30.9	36.2	5.6	32.4	40.3	53.9	13.6	
Vert.	9920.000	AV	31.1	39.8	6.4	33.1	44.2	53.9	9.7	

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

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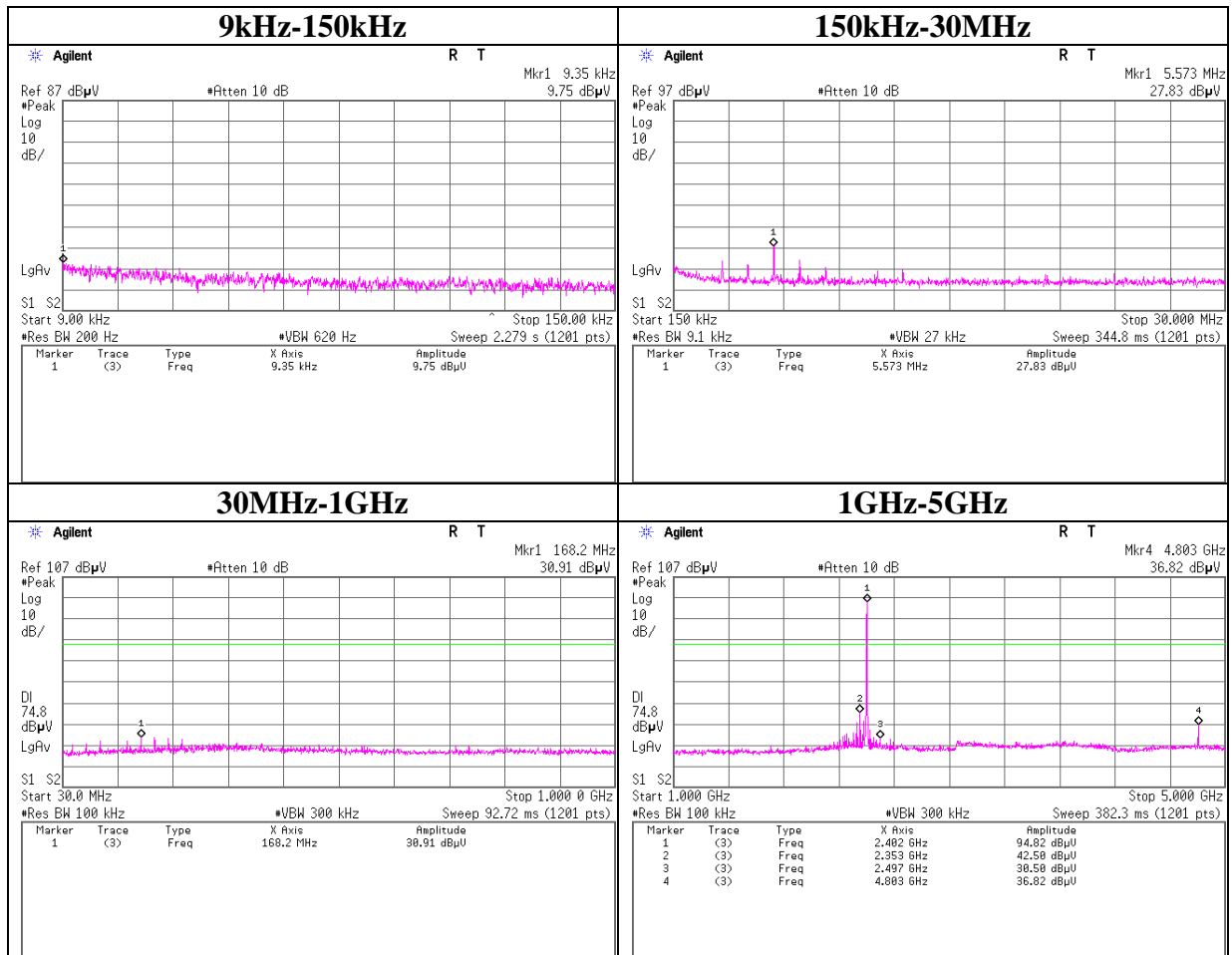
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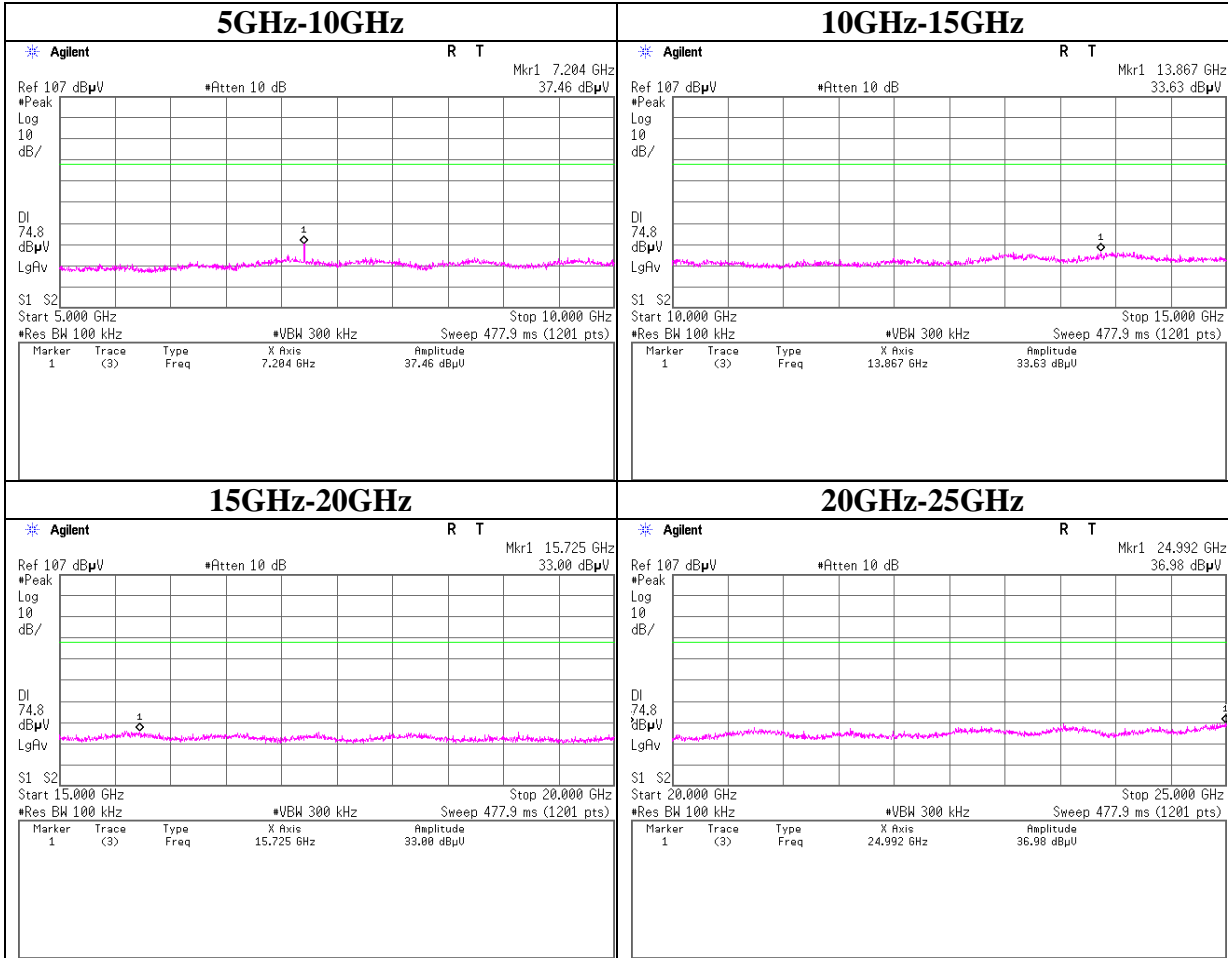
Conducted Spurious Emission

Tx DH5 2402MHz



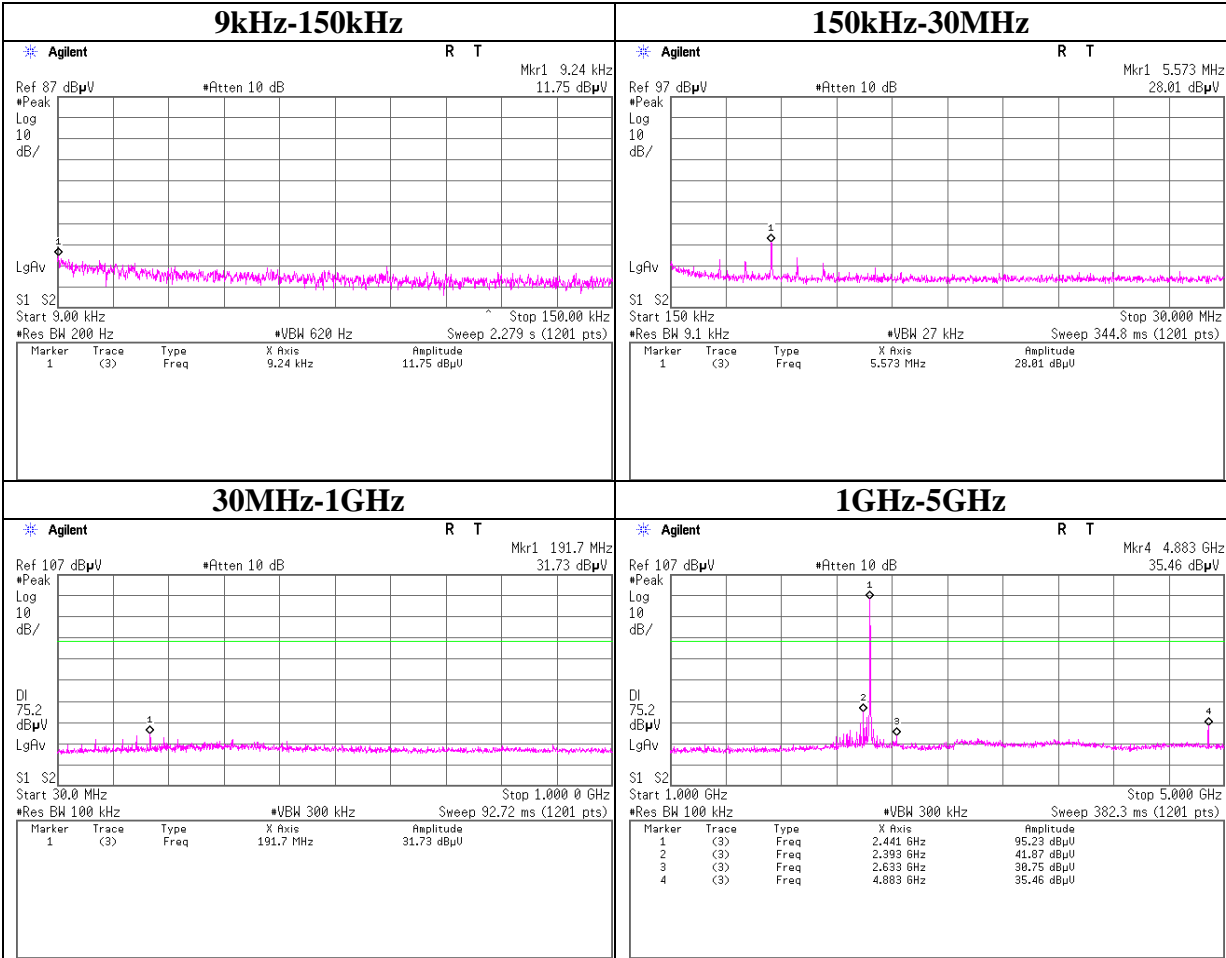
Conducted Spurious Emission

Tx DH5 2402MHz



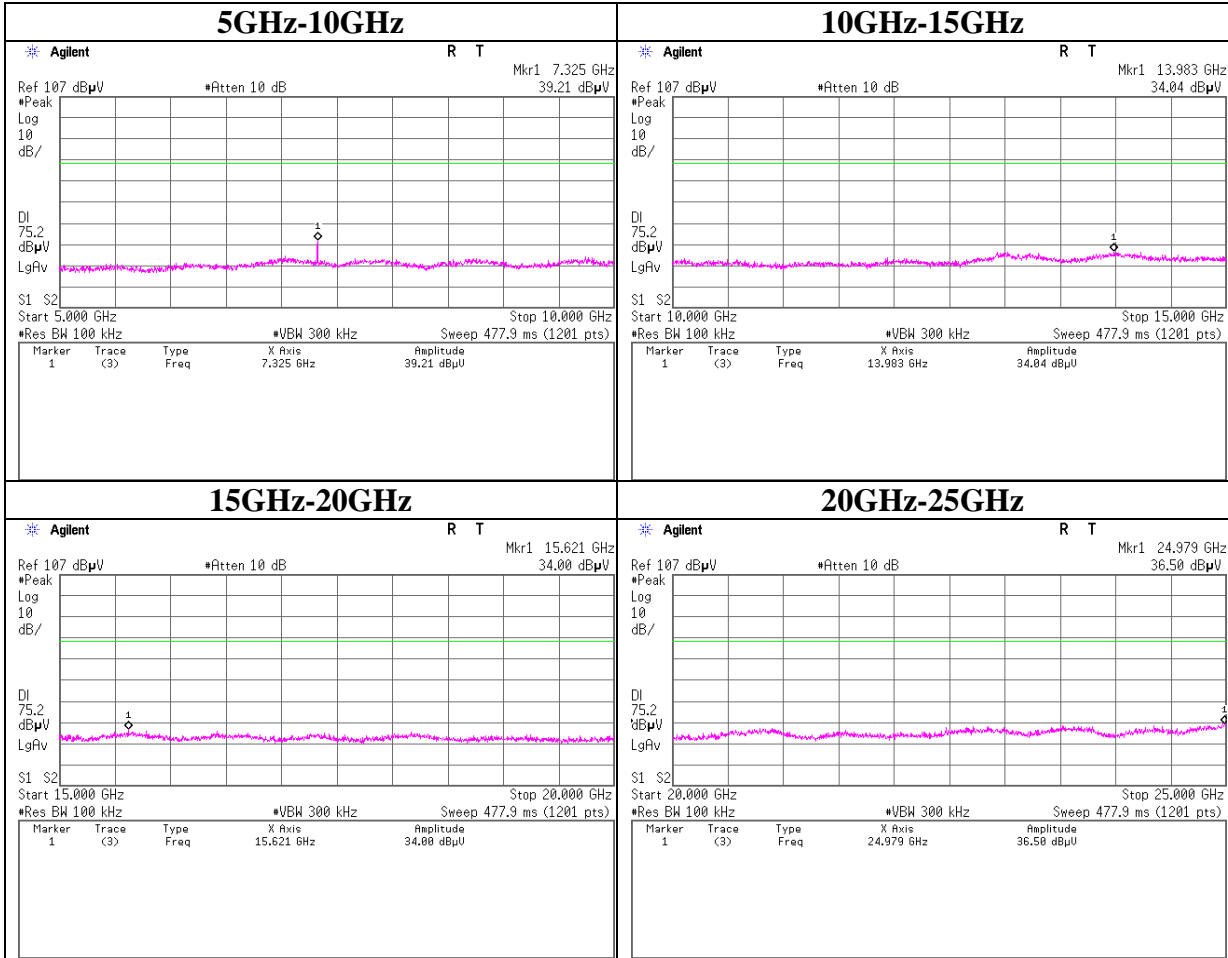
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Tx DH5 2441MHz



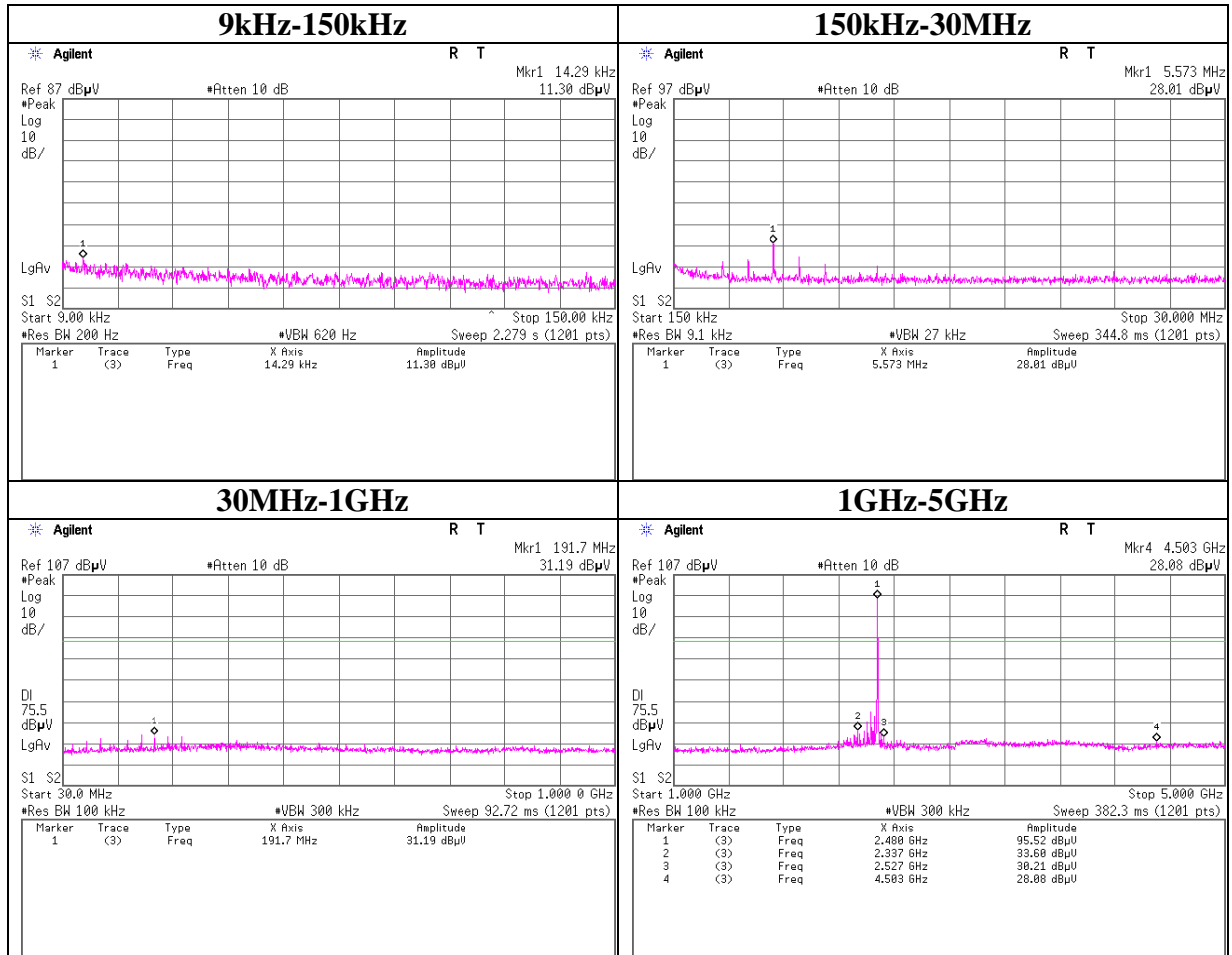
Conducted Spurious Emission

Tx DH5 2441MHz



Conducted Spurious Emission

Tx DH5 2480MHz



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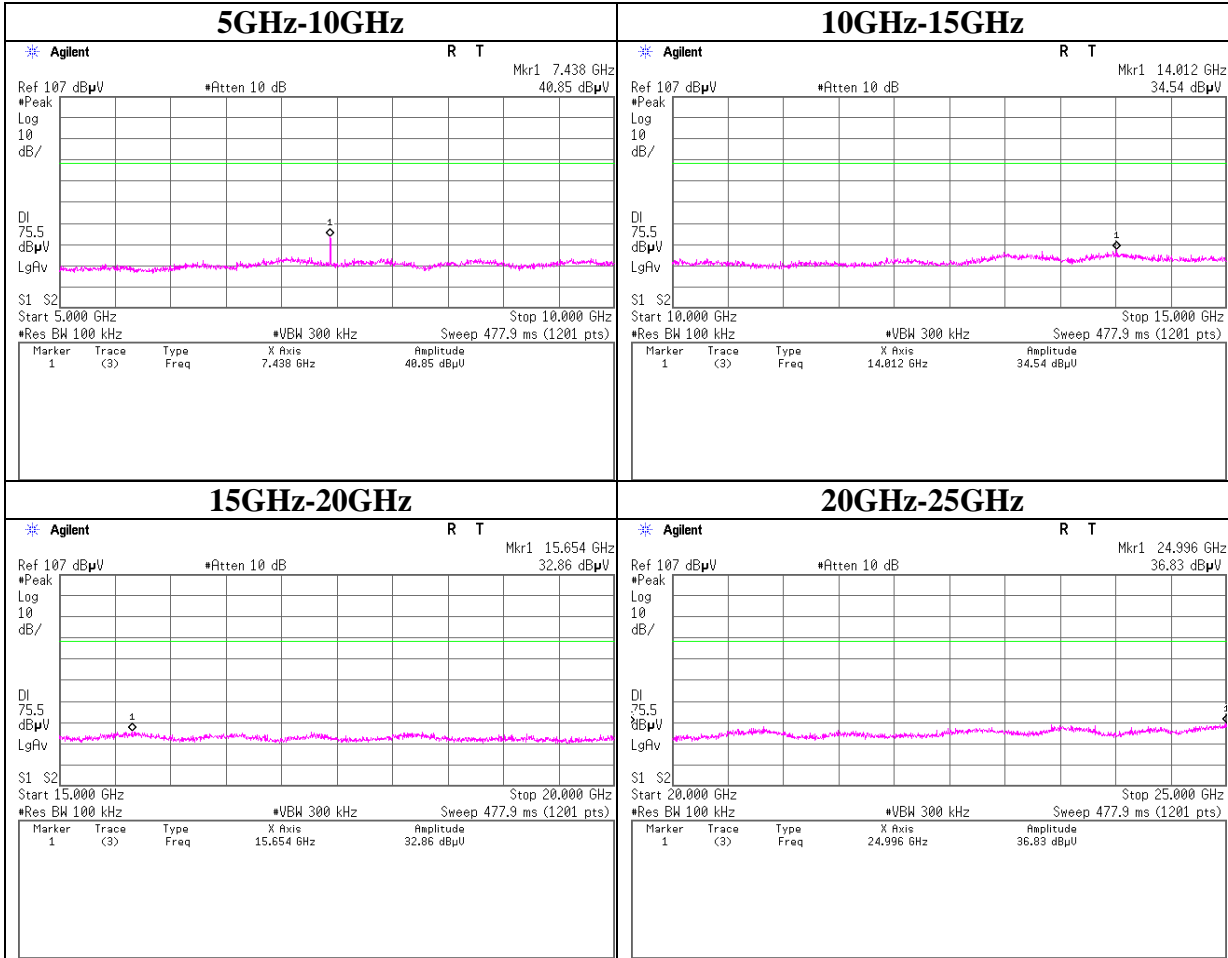
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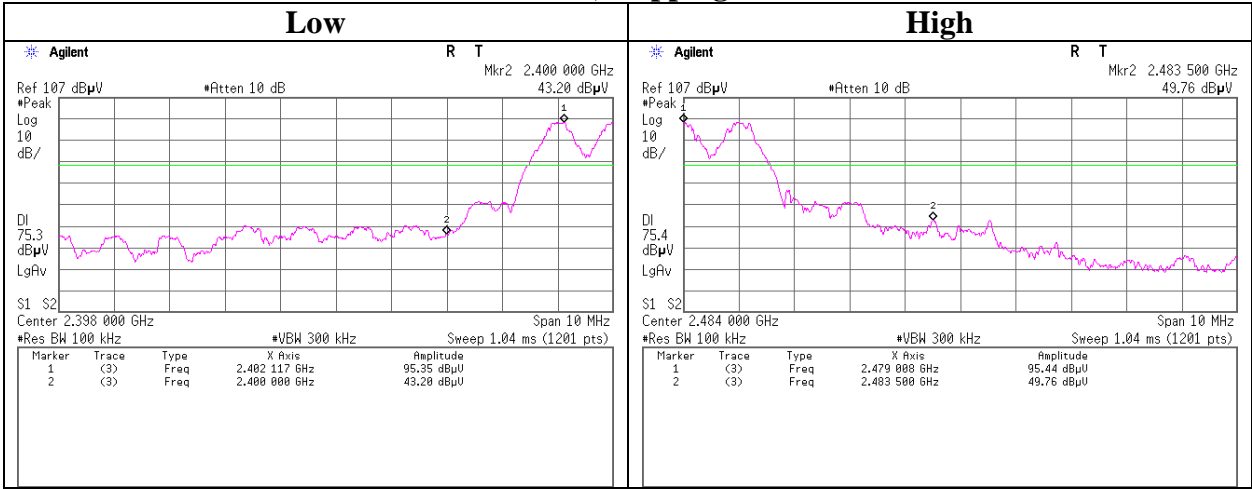
Conducted Spurious Emission

Tx DH5 2480MHz

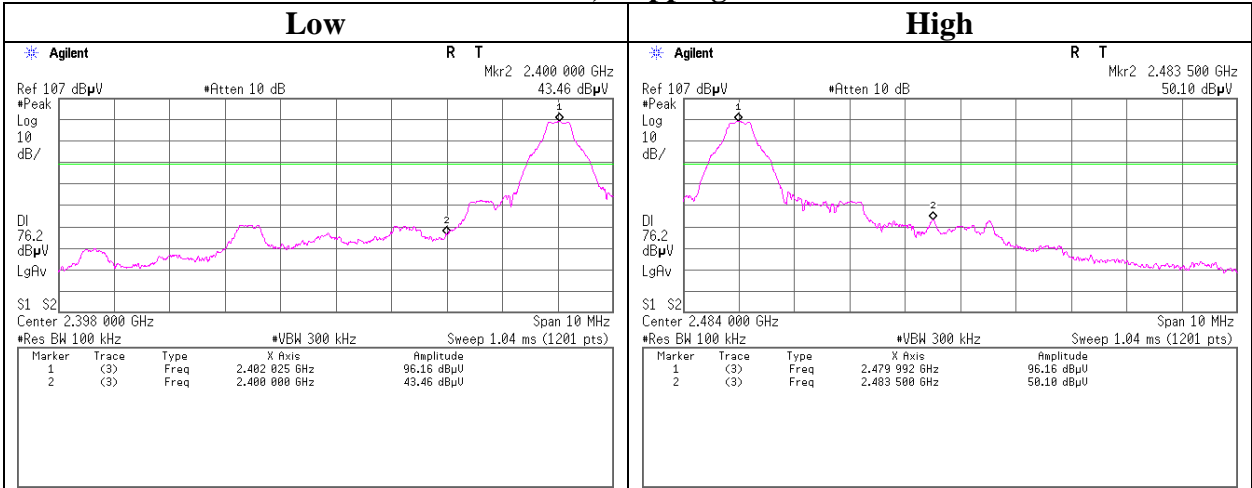


Conducted Emission Band Edge compliance

Tx DH5, Hopping on

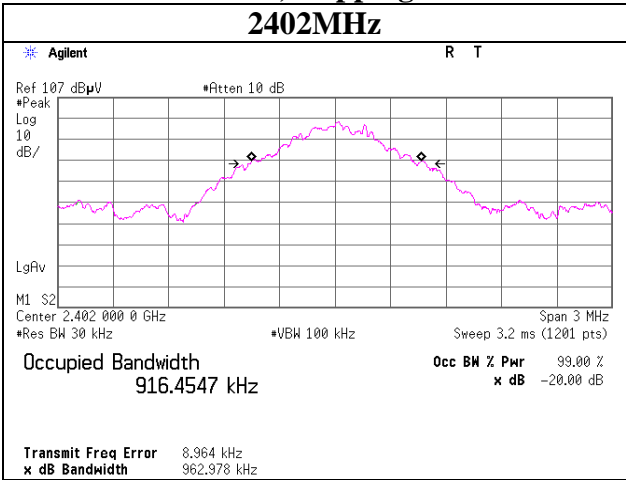


Tx DH5, Hopping off

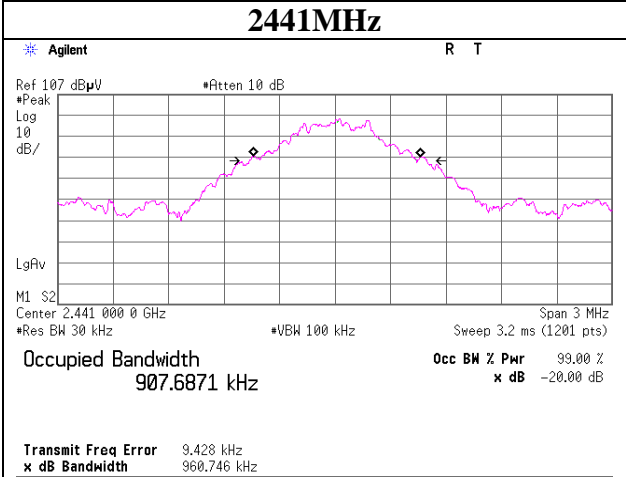


99%Occupied Bandwidth

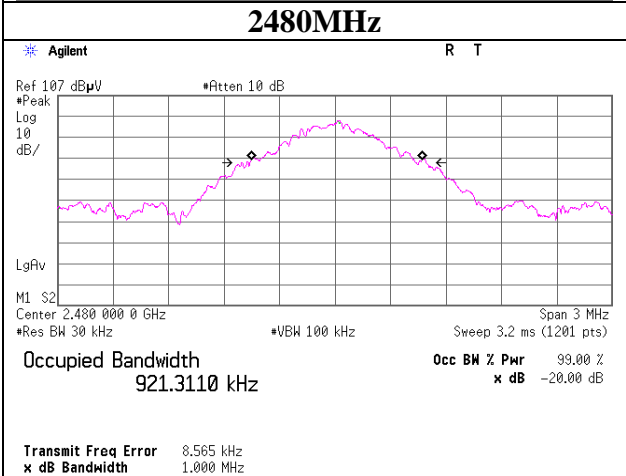
Tx DH5, Hopping off
2402MHz



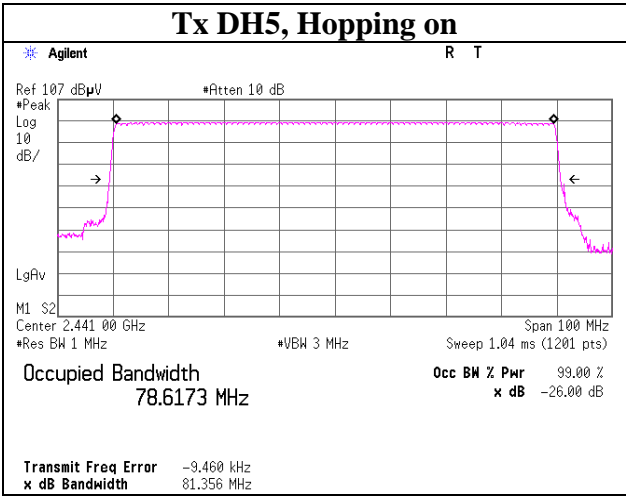
2441MHz



2480MHz



99%Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT	2013/04/03 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2012/10/08 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2012/10/08 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2013/03/21 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2013/08/19 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2013/02/26 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2013/02/28 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2013/02/26 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2012/11/20 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2013/08/20 * 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	2013/07/23 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2013/04/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2013/03/12 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2013/05/17 * 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	2013/03/12 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2013/05/17 * 12
MHF-19	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	602	RE	2012/09/12 * 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: RE: Radiated Emission

AT: Antenna Terminal Conducted test

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