



Test report No. : 10602930S-C
Page : 1 of 44
Issued date : January 13, 2015
Revised date : January 19, 2015
FCC ID : AK8MDR1ABT

RADIO TEST REPORT

Test Report No.: 10602930S-C

Applicant : **Sony Corporation**
Type of Equipment : **Wireless Stereo Headset**
Model No. : **MDR-1ABT**
FCC ID : **AK8MDR1ABT**
Test regulation : **FCC Part15 Subpart C: 2014**
Test result : **Complied**

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2. The results in this report apply only to the sample tested.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: December 10 to 11, 2014

Tested by: *S. Takano*
Shinichi Takano
Engineer
Consumer Technology Division

Approved by : *T. Imamura*
Toyokazu Imamura
Leader
Consumer Technology Division



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13-EM-F0429

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SECTION 1: Customer information

Company name : Sony Corporation
Brand name : SONY
Address : 2-10-1 Osaki, Shinagawa-ku, Tokyo 141-8610 Japan
Telephone Number : +81-50-3750-7634
Contact Person : Shigeru Higai

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless Stereo Headset
Model Number : MDR-1ABT
Serial Number : Refer to Clause 4.2
Rating : DC3.7V
Country of Mass-production : China
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : December 3, 2014
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: MDR-1ABT (referred to as the EUT in this report) is a Wireless Stereo Headset.

Clock frequencies: DSP:122.88MHz, Bluetooth:80MHz, Codec:49.152MHz, MCU1:8MHz, MCU2:48MHz, MCU3:16MHz, Crystal Resonator: 26MHz

Bluetooth specification:

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth / Channel spacing : 1MHz / 1MHz
Type of modulation : FHSS (GFSK, $\pi/4$ -DQPSK, 8DPSK)
Antenna type : Chip Antenna
Antenna connector type : None
Antenna gain : 1.6 dBi
ITU code : F1D, G1D
Operation temperature range : 0 to +40 deg.C

FCC 15.31 (e)

The EUT is a battery-operated device and test was performed with the full-charged battery. Therefore, the EUT complies with the requirement.

FCC 15.203

The equipment and its antenna comply with the requirement since the antenna is built in the equipment and it cannot be replaced by end users.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2014, final revised on December 23, 2014
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,
and 5725-5850MHz

* The revision on December 23, 2014 does not affect the test specification applied to the EUT.

* The EUT has been tested for compliance with FCC Part 15 Subpart B. Refer to the test report: 10602930S-E.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results	
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	-	-	
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A	*See data.	Complied	
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A		-	
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied	
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied	
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (b)(1)	Conducted	N/A		Complied	
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (d) 15.209	Conducted/ Radiated	N/A		10.1 dB Freq.: 12010.000 MHz Polarization: Horizontal Detection: AV Mode: Tx 2402MHz, 3-DH5	Complied

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

*1) The test is not applicable since the EUT has no AC mains. Bluetooth does not operate during charging.

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3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 6.6	-	Conducted	-	-
Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422					

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

3.4 Uncertainty

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

Item	Frequency range	No.1 SAC*1/SR*2 (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.5 dB	3.5 dB
	30MHz-300MHz	4.9 dB	4.9 dB	4.7 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-15GHz	4.9 dB	4.9 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.7 dB	5.7 dB	5.7 dB
	18GHz-40GHz	4.5 dB	4.3 dB	4.3 dB

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission

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

Antenna port conducted test

Power Measurement uncertainty above 1GHz for this test was: (±) 0.68dB

Conducted emissions, Power Density Measurement (below 1GHz) uncertainty for this test was: (±) 1.5dB

Conducted emissions, Power Density Measurement (1G-3GHz) uncertainty for this test was: (±) 1.7dB

Conducted emissions, Power Density Measurement (3G-18GHz) uncertainty for this test was: (±) 2.4dB

Conducted emissions Measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.5dB

Bandwidth Measurement uncertainty for this test was: (±) 0.66%

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3.5 Test location

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JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input checked="" type="checkbox"/> No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.7 Shielded room	-	2.76 x 3.76 x 2.4	2.76 x 3.76	-
<input type="checkbox"/> No.8 Shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
<input type="checkbox"/> No.1 Measurement room	-	2.55 x 4.1 x 2.5	2.55 x 4.1	-

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating mode

Test item	Operating mode	Tested frequency
Carrier frequency separation, Number of hopping frequency	Transmitting (Tx) Hopping ON (DH5 / 3-DH5)/Inquiry, Payload: PRBS9	-
20dB bandwidth	Transmitting (Tx) Hopping OFF (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Dwell time	Transmitting (Tx) (Hopping ON) - DH1, - DH3, - DH5 - 3-DH1, - 3-DH3, - 3-DH5 -Inquiry	-
Maximum peak conducted output power	Transmitting (Tx) Hopping OFF (DH5 / 2-DH5 / 3-DH5) / Inquiry, Payload: PRBS9 - DH5 - 2-DH5 - 3-DH5	2402MHz, 2441MHz, 2480MHz
Band edge compliance & Spurious emission (Conducted)	Transmitting (Tx) (DH5 / 3-DH5), Payload: PRBS9 -Hopping ON / Inquiry -Hopping OFF	Band edge compliance: 2402MHz, 2480MHz
(Radiated)	Transmitting (Tx) (DH5 / 3-DH5), Payload: PRBS9	Spurious emission: 2402MHz, 2441MHz, 2480MHz
99% occupied bandwidth	Transmitting (Tx) (DH5 / 3-DH5), Payload: PRBS9 -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 packet type / payload (except Dwell time test)</p> <p>*Remarks: 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.</p> <p>*We removed 2-DH mode (2 Mb/s EDR: pi/4DQPSK) except power measurement by using 3-DH mode (3 Mb/s EDR: 8DPSK) as a representative.</p> <p>*EUT has the power settings by the software as follows; Software: CSR Blue Suite BlueTest3 Ver.2.5.0.93 CSR Blue Suite BtCli Ver.2.5.0.93 (Inquiry mode only) Power settings: BDR: Ext.=23, Int.=38, TX PA Atten=1 EDR: Ext.=56, Int.=41, TX PA Atten=0</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>		

Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

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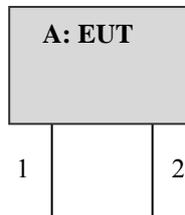
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4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Wireless Stereo Headset	MDR-1ABT	*1)	Sony	EUT

*1) 0000004: Radiated emission tests, 0000003: Antenna terminal conducted tests

List of cable used

No.	Cable name	Length (m)	Shield		Remark
			Cable	Connector	
1	USB	0.5	Shielded	Shielded	-
2	INPUT	1.2	Unshielded	Unshielded	-

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SECTION 5: Carrier frequency separation

Test procedure

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

Summary of the test results: Pass
Refer to APPENDIX 1.

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

Test procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1.

SECTION 7: Number of hopping frequency

Test procedure

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1.

SECTION 8: Dwell time

Test procedure

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1.

SECTION 9: Maximum peak output power

Test procedure

The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Summary of the test results: Pass
Refer to APPENDIX 1.

SECTION 10: Spurious emissions (Antenna port conducted)

Test procedure

The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating,

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

In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

Summary of the test results: Pass
Refer to APPENDIX 1.

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SECTION 11: Radiated emission

11.1 Operating environment

Test room : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

11.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Photographs of the set up are shown in APPENDIX 3.

11.3 Test conditions

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

11.4 Test procedure

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

The radiated emission measurements were made with the following detection.

Frequency	30-1000MHz	Above 1GHz		20dBc
Detection type	Quasi-Peak	Peak	* Average	Peak
IF Bandwidth	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz	RBW: 100kHz VBW: 300kHz

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

The carrier level and noise levels were confirmed at 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.

Combinations of the worst case

Antenna polarization	Frequency	Carrier *2)	Spurious			
			Below 1GHz	1-2.8GHz	2.8-18GHz	18-25GHz
Horizontal		Z	X	Z	Y	Y
Vertical		X	X	X	X	Z

*2) with spurious emissions near carrier frequency

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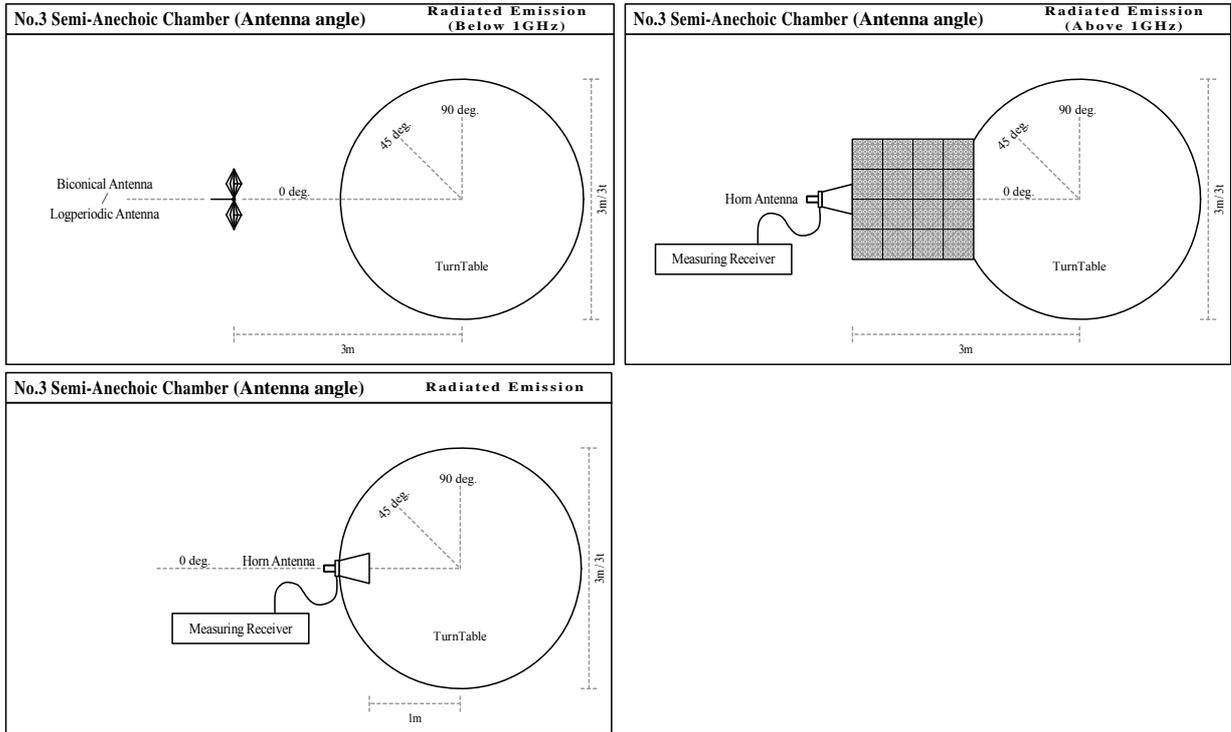
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Figure 1. Antenna angle



11.5 Band edge

Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209 and band edge level at 2400MHz is below the 20dBc. Refer to the data.

11.6 Results

Summary of the test results: Pass *No noise was detected above the 8th order harmonics.

Refer to APPENDIX 1.

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Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

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

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Radiated emission

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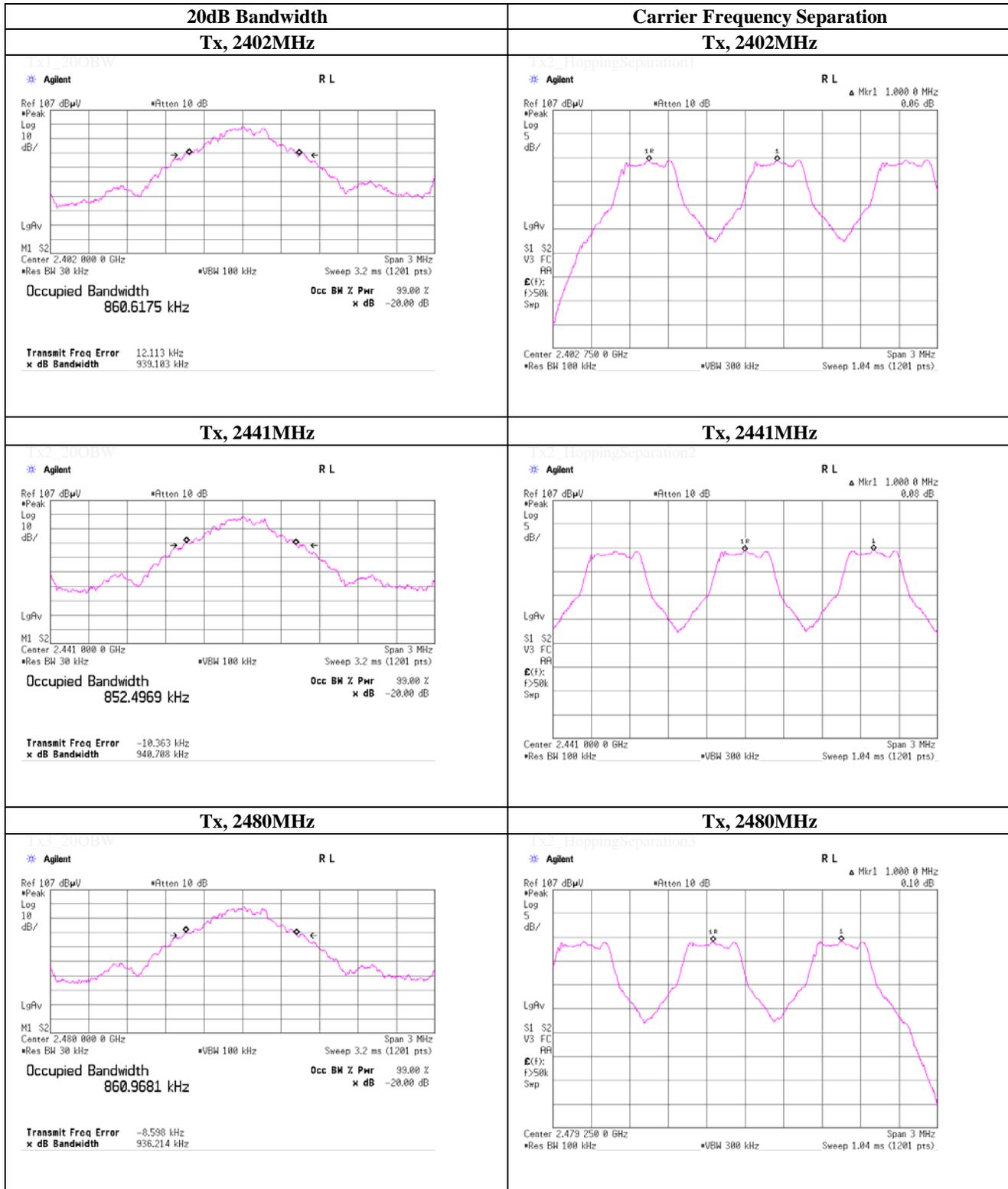
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9



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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date December 10, 2014
 Temperature / Humidity 22 deg.C , 40 %RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth, EDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.262	1.000	>= 0.842
3-DH5	2441.0	1.255	1.000	>= 0.837
3-DH5	2480.0	1.256	1.000	>= 0.837

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

Tx2_Inquiry20OBW

Tx2_InquirySeparation

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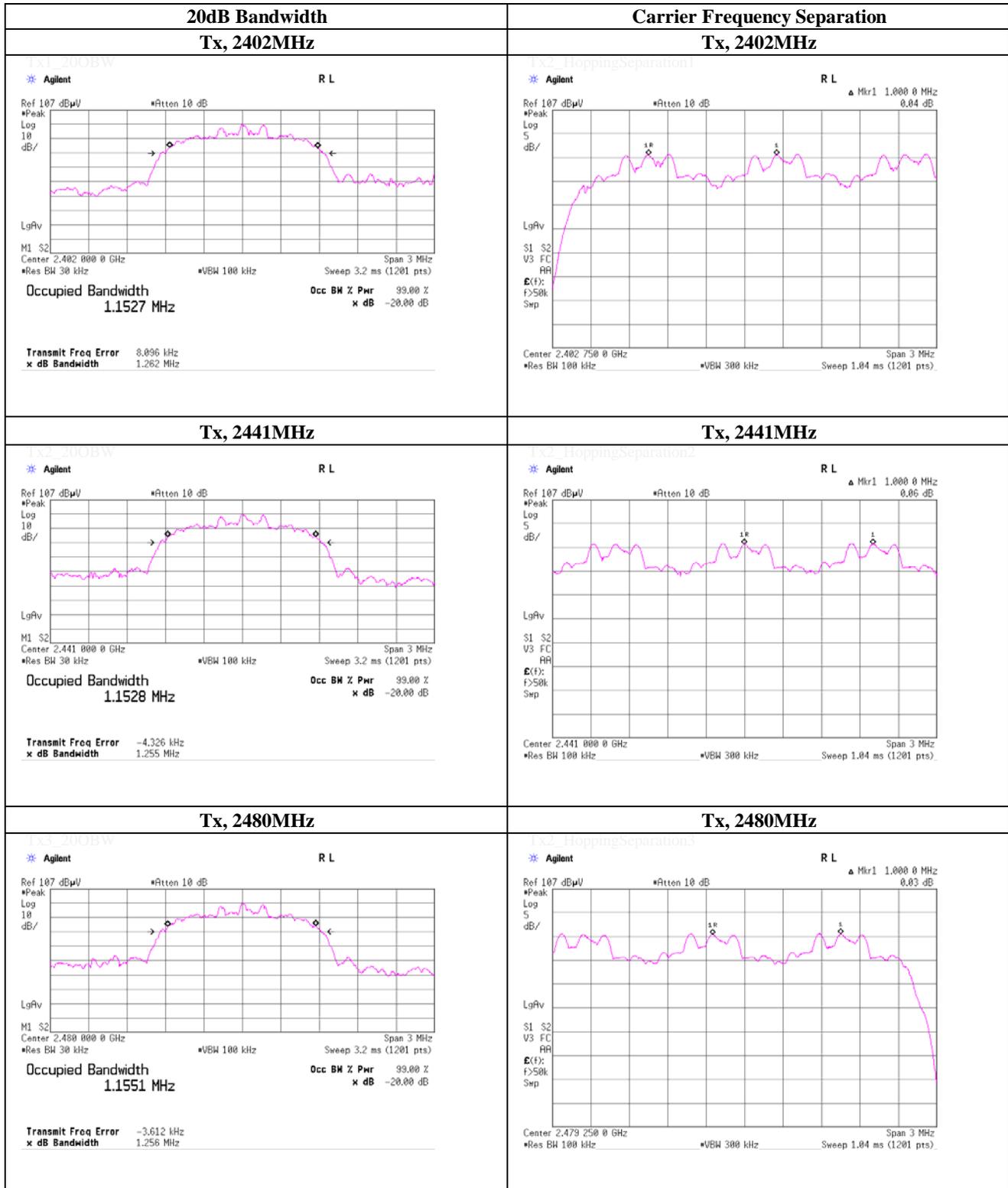
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



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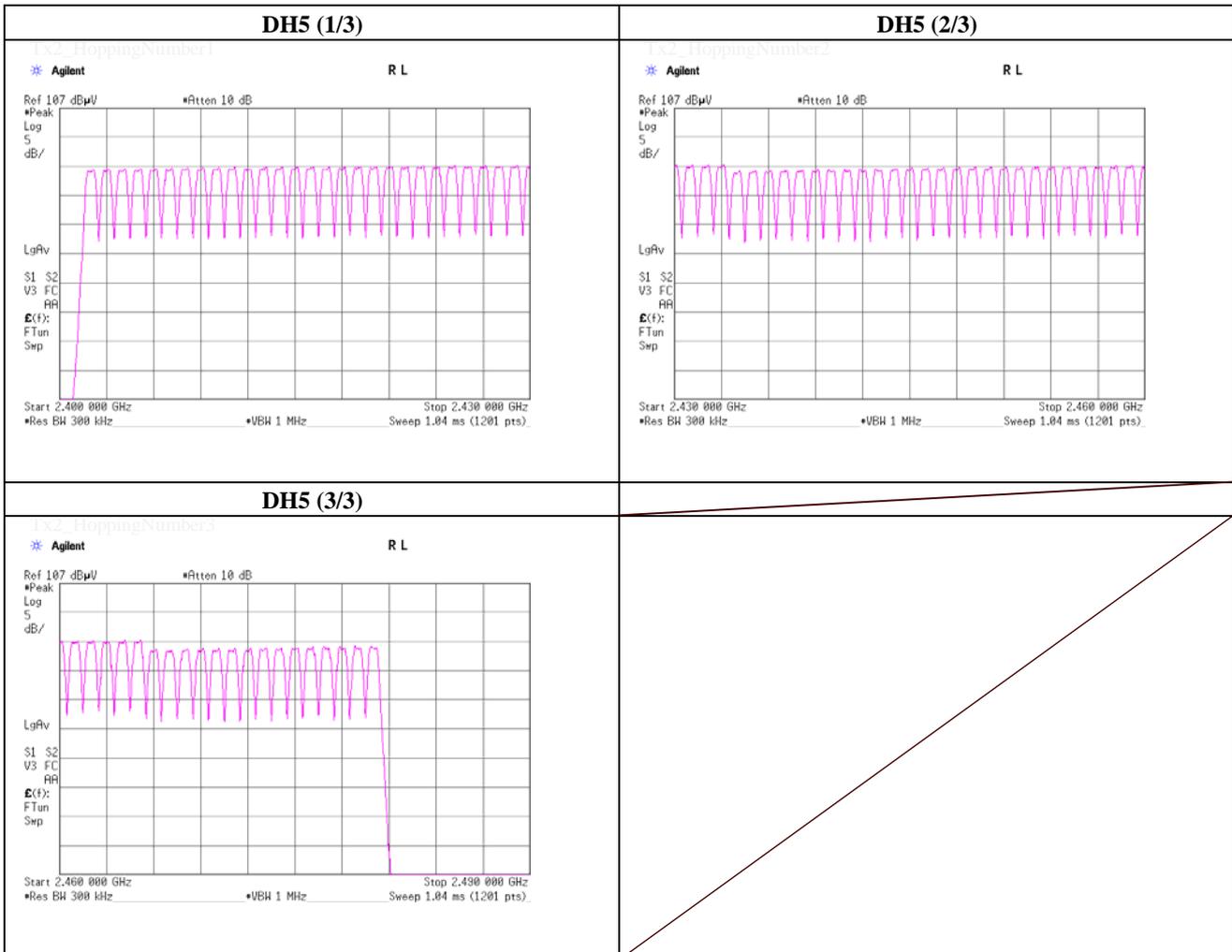
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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 10, 2014	
Temperature / Humidity	22 deg.C , 40 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, BDR, PRBS9	

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

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

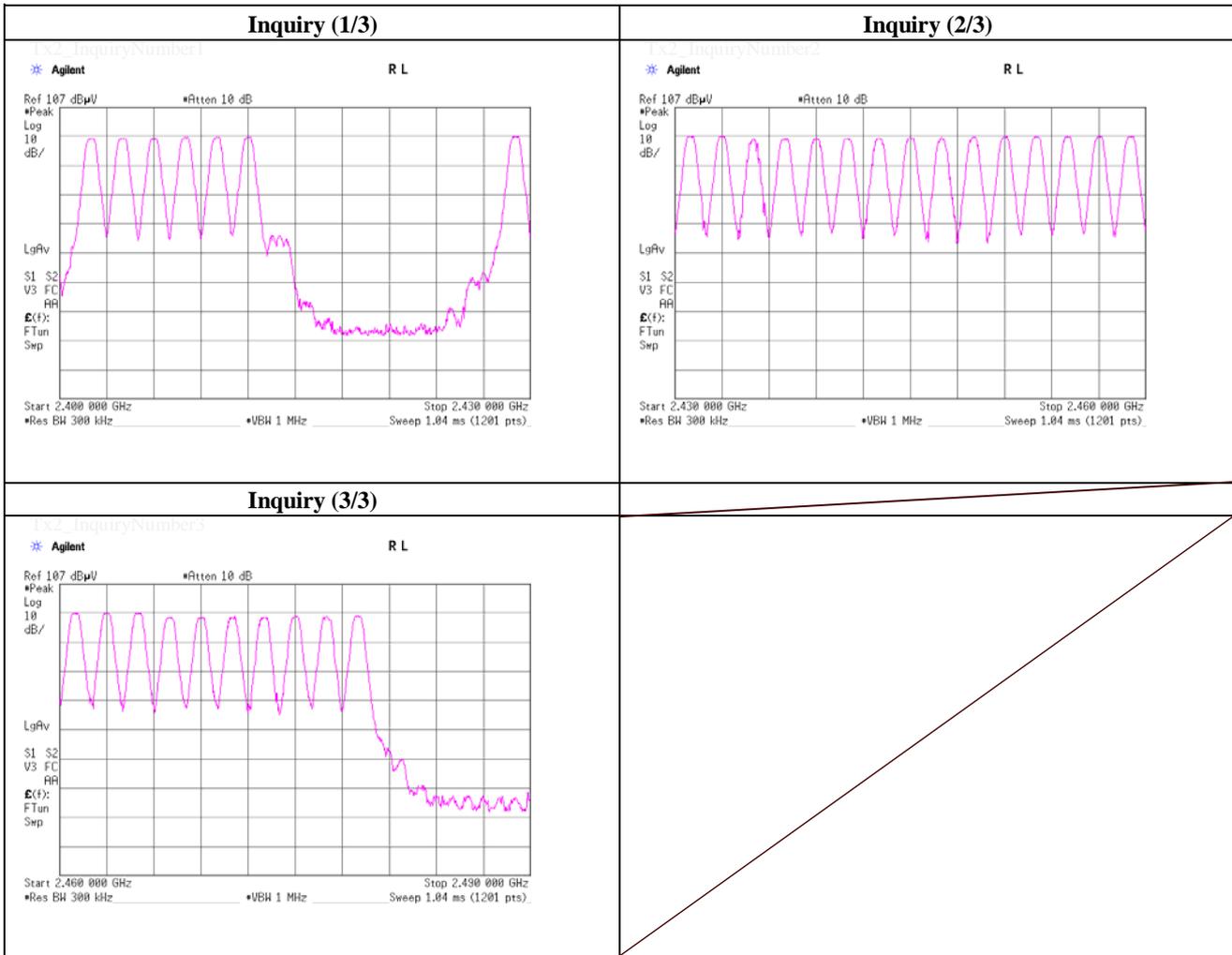


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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 10, 2014	
Temperature / Humidity	22 deg.C ,40 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, Inquiry	

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

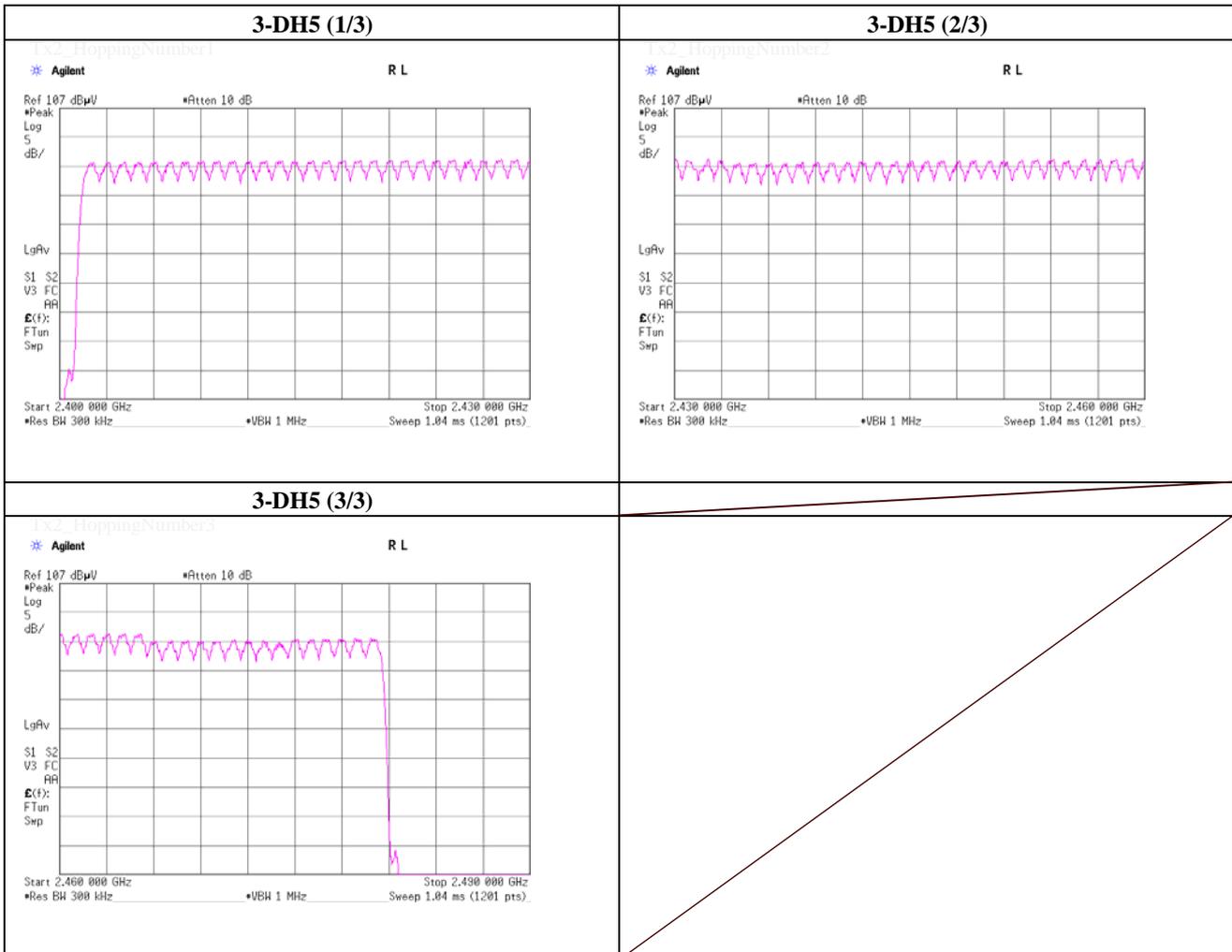


Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 10, 2014	
Temperature / Humidity	22 deg.C , 40 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, EDR, PRBS9	

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

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



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Dwell Time

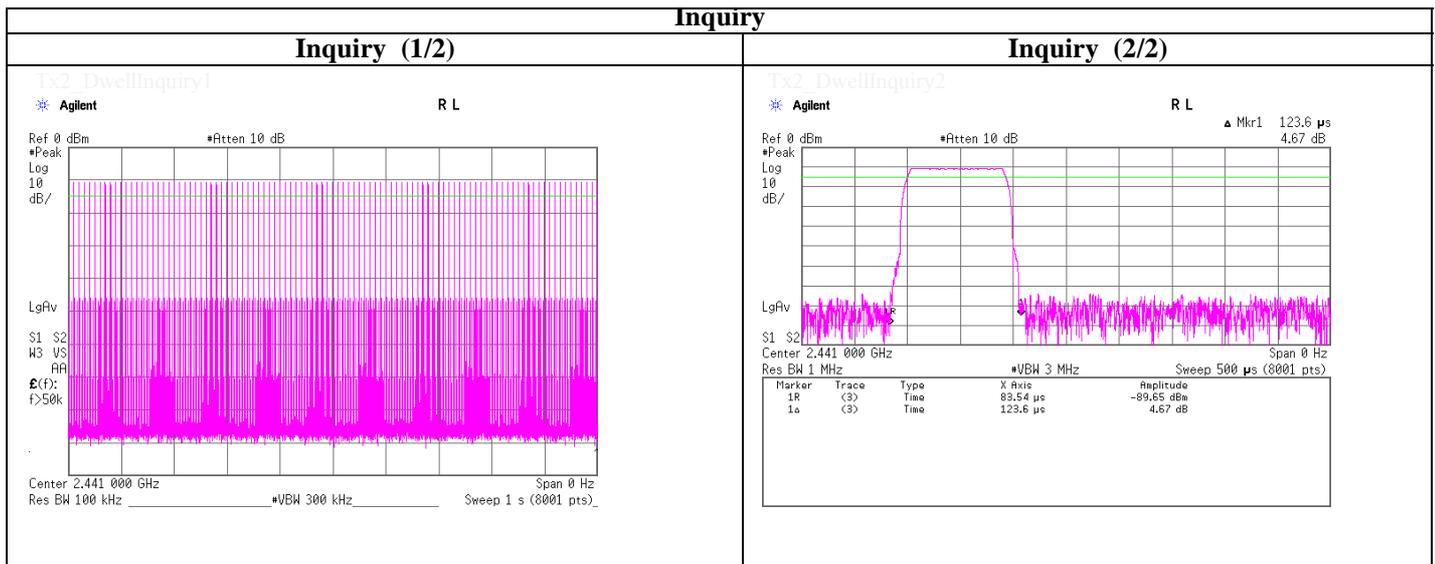
Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 10, 2014	
Temperature / Humidity	22 deg.C , 40 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period	Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	51.0 / 5.0 sec. x 31.6 sec. = 323 times	0.422	136	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.684	278	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.942	318	400
Inquiry	101.0 / 1.0 sec. x 12.8 sec. = 1293 times	0.124	160	400

Sample Calculation

Result = Number of transmission x Length of transmission time

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



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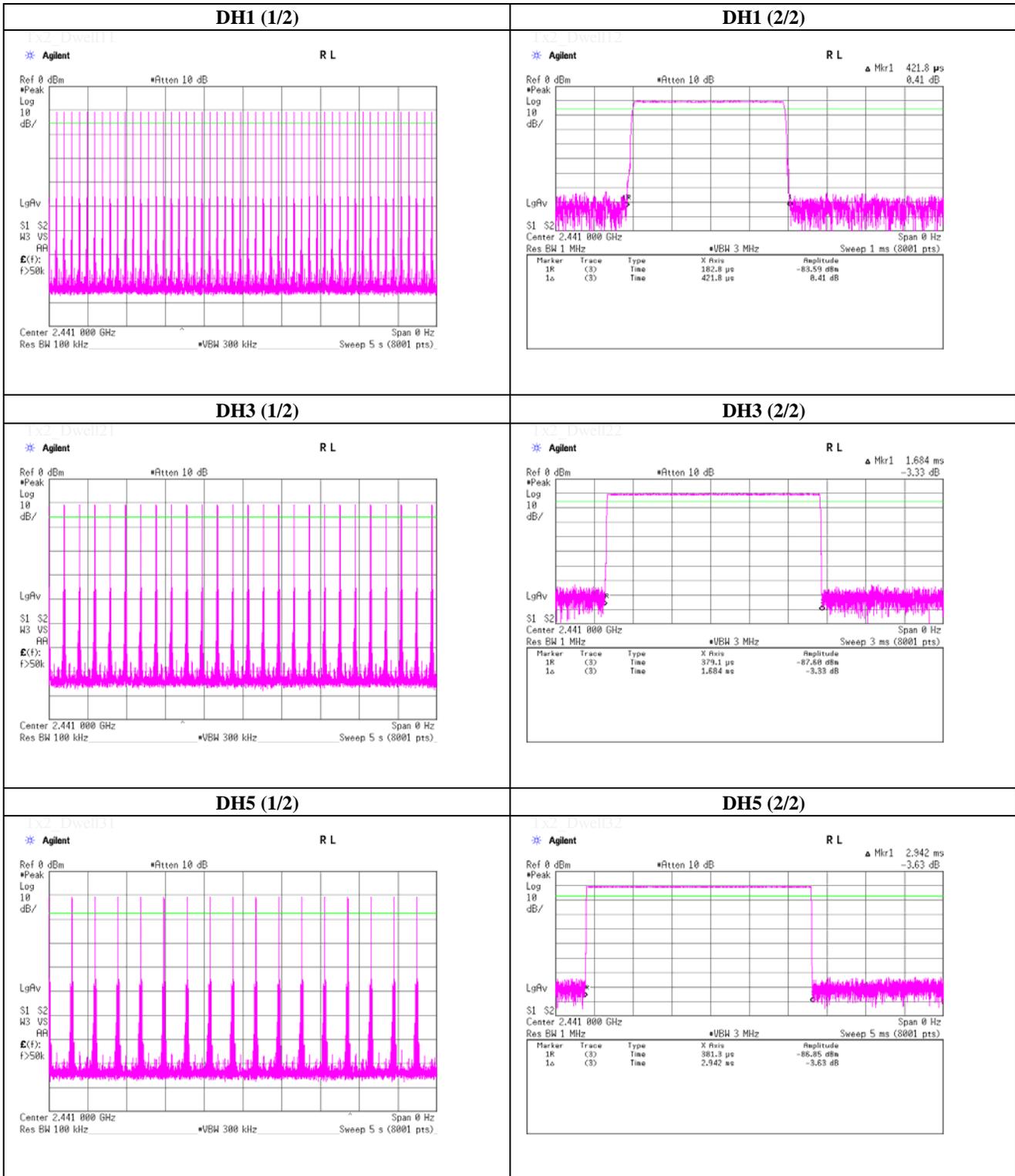
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Dwell time

Tx, Bluetooth, BDR, PRBS9



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date December 10, 2014
 Temperature / Humidity 22 deg.C , 40 %RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth, EDR, PRBS9

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4) second	Length of transmission time [msec]	Result [msec]	Limit [msec]
3-DH1	51.0 / 5.0 sec. x 31.6 sec. = 323 times	0.434	140	400
3-DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.688	279	400
3-DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.939	317	400

Sample Calculation

Result = Number of transmission x Length of transmission time

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

Tx2_DwellInquiry1

Tx2_DwellInquiry2

UL Japan, Inc.

Shonan EMC Lab.

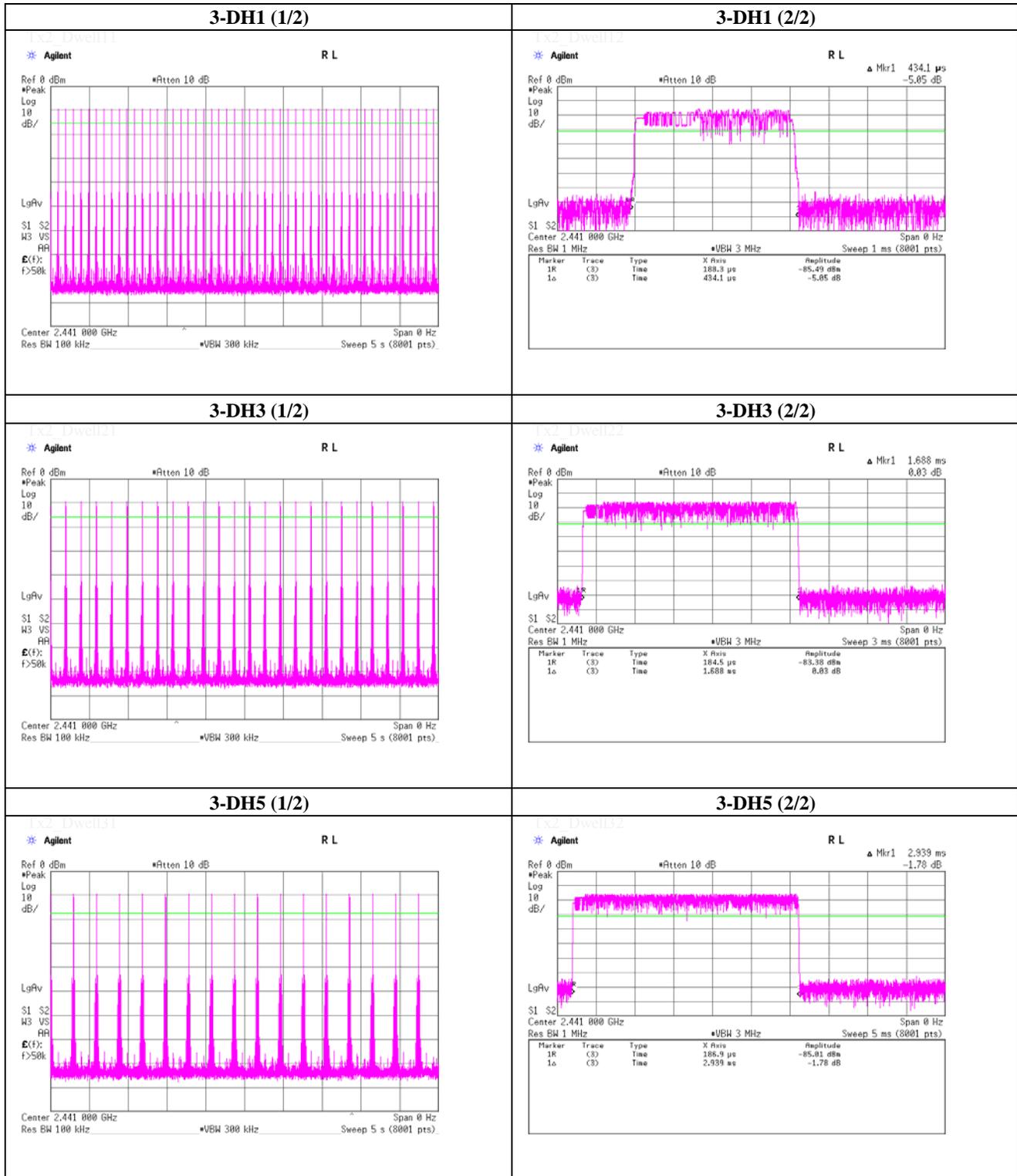
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Dwell time

Tx, Bluetooth, EDR, PRBS9



UL Japan, Inc.

Shonan EMC Lab.

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Telephone : +81 463 50 6400

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Maximum Peak Conducted Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date December 10, 2014
 Temperature / Humidity 22 deg.C , 40 %RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth

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

	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-10.26	1.38	9.90	1.02	1.26	20.97	125	19.95
DH5	2441.0	-10.29	1.39	9.89	0.99	1.26	20.97	125	19.98
DH5	2480.0	-10.57	1.40	9.89	0.72	1.18	20.97	125	20.25
2-DH5	2402.0	-11.06	1.38	9.90	0.22	1.05	20.97	125	20.75
2-DH5	2441.0	-10.90	1.39	9.89	0.38	1.09	20.97	125	20.59
2-DH5	2480.0	-11.22	1.40	9.89	0.07	1.02	20.97	125	20.90
3-DH5	2402.0	-10.41	1.38	9.90	0.87	1.22	20.97	125	20.10
3-DH5	2441.0	-10.39	1.39	9.89	0.89	1.23	20.97	125	20.08
3-DH5	2480.0	-10.58	1.40	9.89	0.71	1.18	20.97	125	20.26

Sample Calculation:

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

(Reference maximum conducted power (average))

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

	Freq. [MHz]	P/M (Average) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty factor [dB]	Result	
						[dBm]	[mW]
DH5	2402.0	-12.13	1.38	9.90	1.15	0.30	1.07
DH5	2441.0	-12.13	1.39	9.89	1.15	0.30	1.07
DH5	2480.0	-12.43	1.40	9.89	1.15	0.01	1.00
2-DH5	2402.0	-15.45	1.38	9.90	1.13	-3.04	0.50
2-DH5	2441.0	-15.39	1.39	9.89	1.13	-2.98	0.50
2-DH5	2480.0	-15.63	1.40	9.89	1.13	-3.21	0.48
3-DH5	2402.0	-15.47	1.38	9.90	1.12	-3.07	0.49
3-DH5	2441.0	-15.41	1.39	9.89	1.12	-3.01	0.50
3-DH5	2480.0	-15.65	1.40	9.89	1.12	-3.24	0.47

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty factor

* Duty factor is refer to the page of "(Reference) duty chart for Maximum conducted power"

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Dwell time factor Calculation chart

Dwell time factor Calculation

Tx, Bluetooth, BDR, PRBS9

<p>Worst 100ms Dwell time factor = $20\log((2.942 \times 2)/100) = -24.61\text{dB}$</p> <p><small>1x2_duty2</small></p> <p>ON time of some channel during 100ms: Twice This is the worst case in hopping sequence of Bluetooth.</p>	<p>1cycle On time : 2.942ms</p> <p><small>1x2_Dwell32</small></p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td>1R</td> <td>(3)</td> <td>Time</td> <td>381.3 us</td> <td>-86.85 dBm</td> </tr> <tr> <td>1a</td> <td>(3)</td> <td>Time</td> <td>2.942 ms</td> <td>-3.63 dB</td> </tr> </tbody> </table>	Marker	Trace	Type	X Axis	Amplitude	1R	(3)	Time	381.3 us	-86.85 dBm	1a	(3)	Time	2.942 ms	-3.63 dB
Marker	Trace	Type	X Axis	Amplitude												
1R	(3)	Time	381.3 us	-86.85 dBm												
1a	(3)	Time	2.942 ms	-3.63 dB												

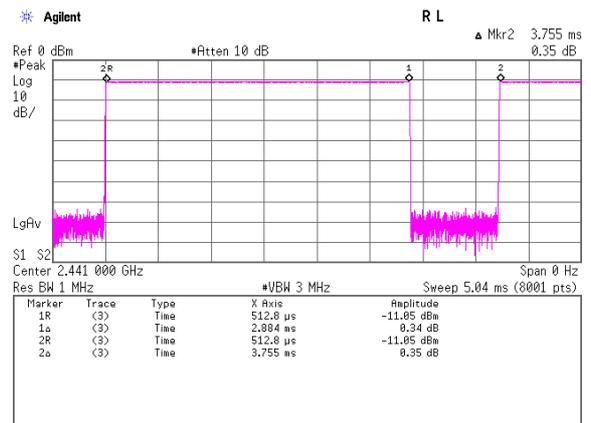
VBW (Average) setting

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

(Reference) duty chart for Maximum conducted power

(Reference duty chart for Maximum conducted power)

DH5



on time [ms] 2.884 1cycle[ms] 3.755 duty 0.768

duty factor [dB] 1.15

* calculation: duty factor [dB] = 10 x log (1cycle [ms] / on time [ms])

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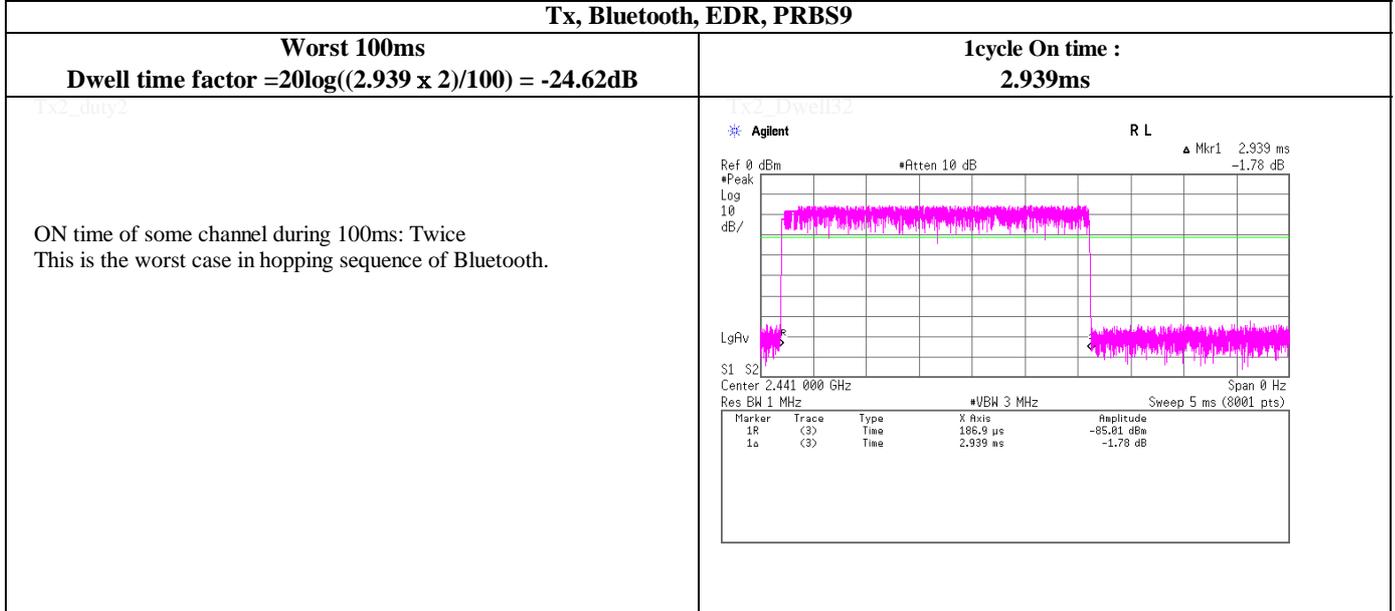
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Dwell time factor Calculation chart

Dwell time factor Calculation

Tx, Bluetooth, EDR, PRBS9



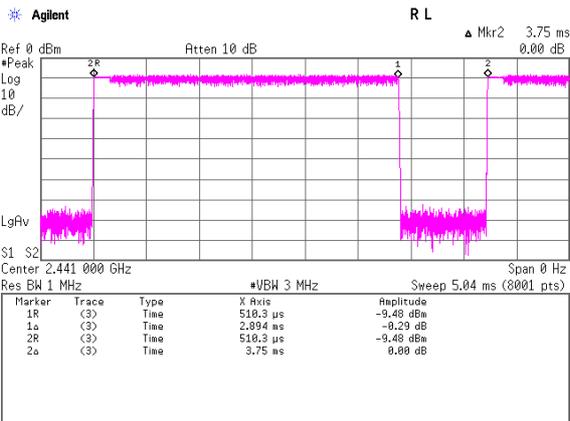
VBW (Average) setting

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

(Reference) duty chart for Maximum conducted power

(Reference duty chart for Maximum conducted power)

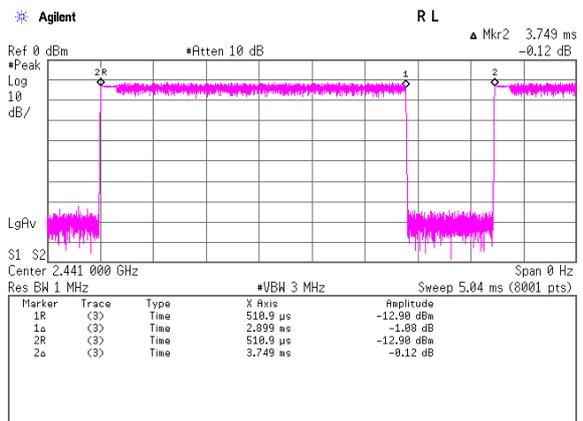
2-DH5



on time [ms] 2.894 1cycle[ms] 3.75 duty 0.772
 duty factor [dB] 1.13

* calculation: duty factor [dB] = $10 \times \log (1\text{cycle [ms]} / \text{on time [ms]})$

3-DH5



on time [ms] 2.899 1cycle[ms] 3.749 duty 0.773
 duty factor [dB] 1.12

* calculation: duty factor [dB] = $10 \times \log (1\text{cycle [ms]} / \text{on time [ms]})$

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date December 10, 2014 December 11, 2014
 Temperature / Humidity 22 deg.C, 21 %RH 22 deg.C, 32 %RH
 Engineer Shinichi Takano Hikaru Shirasawa
 Mode Tx, 2402 MHz
 Tx, Bluetooth, BDR

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	431.998	QP	24.3	16.9	9.0	32.0	18.2	46.0	27.8	100	343	
Hori.	2246.006	PK	47.7	26.1	13.4	41.2	46.0	73.9	27.9	132	142	
Hori.	2390.000	PK	47.6	26.4	13.6	41.1	46.5	73.9	27.4	132	142	
Hori.	2558.014	PK	49.4	26.7	13.7	41.0	48.8	73.9	25.1	132	142	
Hori.	4804.000	PK	49.8	30.6	5.5	39.8	46.1	73.9	27.8	100	60	
Hori.	7206.000	PK	45.8	36.6	6.9	40.2	49.1	73.9	24.8	100	0	
Hori.	9608.000	PK	45.7	38.5	7.9	40.1	52.0	73.9	21.9	100	0	
Hori.	12010.000	PK	45.6	39.5	8.9	39.6	54.4	73.9	19.5	100	0	
Hori.	19220.000	PK	51.6	40.1	-2.6	45.3	43.8	73.9	30.1	100	135	
Hori.	2246.006	AV	37.7	26.1	13.4	41.2	36.0	53.9	17.9	132	142	
Hori.	2390.000	AV	34.5	26.4	13.6	41.1	33.4	53.9	20.5	132	142	
Hori.	2558.014	AV	42.1	26.7	13.7	41.0	41.5	53.9	12.4	132	142	
Hori.	4804.000	AV	42.1	30.6	5.5	39.8	38.4	53.9	15.5	100	60	
Hori.	7206.000	AV	34.2	36.6	6.9	40.2	37.5	53.9	16.4	100	0	
Hori.	9608.000	AV	34.5	38.5	7.9	40.1	40.8	53.9	13.1	100	0	
Hori.	12010.000	AV	34.4	39.5	8.9	39.6	43.2	53.9	10.7	100	0	
Hori.	19220.000	AV	42.6	40.1	-2.6	45.3	34.8	53.9	19.1	100	135	
Vert.	431.998	QP	23.2	16.9	9.0	32.0	17.1	46.0	28.9	100	299	
Vert.	2390.000	PK	46.5	26.4	13.6	41.1	45.4	73.9	28.5	100	342	
Vert.	2558.003	PK	47.7	26.7	13.7	41.0	47.1	73.9	26.8	100	342	
Vert.	4804.000	PK	50.5	30.6	5.5	39.8	46.8	73.9	27.1	100	131	
Vert.	7206.000	PK	46.0	36.6	6.9	40.2	49.3	73.9	24.6	100	0	
Vert.	9608.000	PK	45.8	38.5	7.9	40.1	52.1	73.9	21.8	100	0	
Vert.	12010.000	PK	47.9	39.5	8.9	39.6	56.7	73.9	17.2	100	0	
Vert.	19220.000	PK	50.6	40.1	-2.6	45.3	42.8	73.9	31.1	100	90	
Vert.	2390.000	AV	33.9	26.4	13.6	41.1	32.8	53.9	21.1	100	342	
Vert.	2558.003	AV	37.4	26.7	13.7	41.0	36.8	53.9	17.1	100	342	
Vert.	4804.000	AV	42.5	30.6	5.5	39.8	38.8	53.9	15.1	100	131	
Vert.	7206.000	AV	34.3	36.6	6.9	40.2	37.6	53.9	16.3	100	0	
Vert.	9608.000	AV	34.4	38.5	7.9	40.1	40.7	53.9	13.2	100	0	
Vert.	12010.000	AV	34.9	39.5	8.9	39.6	43.7	53.9	10.2	100	0	
Vert.	19220.000	AV	42.5	40.1	-2.6	45.3	34.7	53.9	19.2	100	90	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	98.3	26.4	13.6	41.1	97.2	-	-	Carrier
Hori.	2400.000	PK	56.3	26.4	13.6	41.1	55.2	77.2	22.0	
Vert.	2402.000	PK	96.6	26.4	13.6	41.1	95.5	-	-	Carrier
Vert.	2400.000	PK	54.3	26.4	13.6	41.1	53.2	75.5	22.3	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date December 10, 2014 December 11, 2014
 Temperature / Humidity 22 deg.C, 21 %RH 22 deg.C, 32 %RH
 Engineer Shinichi Takano Hikaru Shirasawa
 Mode Tx, 2441 MHz
 Tx, Bluetooth, BDR

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	432.000	QP	24.3	16.9	9.0	32.0	18.2	46.0	27.8	100	171	
Hori.	2545.016	PK	48.1	26.7	13.7	41.0	47.5	73.9	26.4	133	147	
Hori.	4882.000	PK	49.8	30.9	5.5	39.7	46.5	73.9	27.4	100	123	
Hori.	7323.000	PK	45.2	36.8	6.8	40.3	48.5	73.9	25.4	100	0	
Hori.	9764.000	PK	46.5	38.6	8.0	40.0	53.1	73.9	20.8	100	0	
Hori.	12205.000	PK	46.0	39.4	9.0	39.8	54.6	73.9	19.3	100	0	
Hori.	19524.000	PK	52.0	40.1	-2.5	45.6	44.0	73.9	29.9	100	134	
Hori.	2545.016	AV	40.2	26.7	13.7	41.0	39.6	53.9	14.3	133	147	
Hori.	4882.000	AV	41.6	30.9	5.5	39.7	38.3	53.9	15.6	100	123	
Hori.	7323.000	AV	34.0	36.8	6.8	40.3	37.3	53.9	16.6	100	0	
Hori.	9764.000	AV	33.9	38.6	8.0	40.0	40.5	53.9	13.4	100	0	
Hori.	12205.000	AV	34.0	39.4	9.0	39.8	42.6	53.9	11.3	100	0	
Hori.	19524.000	AV	43.6	40.1	-2.5	45.6	35.6	53.9	18.3	100	134	
Vert.	432.000	QP	23.3	16.9	9.0	32.0	17.2	46.0	28.8	269	277	
Vert.	2544.976	PK	47.5	26.7	13.7	41.0	46.9	73.9	27.0	100	359	
Vert.	4882.000	PK	50.7	30.9	5.5	39.7	47.4	73.9	26.5	107	115	
Vert.	7323.000	PK	45.4	36.8	6.8	40.3	48.7	73.9	25.2	100	0	
Vert.	9764.000	PK	46.6	38.6	8.0	40.0	53.2	73.9	20.7	100	0	
Vert.	12205.000	PK	45.9	39.4	9.0	39.8	54.5	73.9	19.4	100	0	
Vert.	19523.990	PK	51.3	40.1	-2.5	45.6	43.3	73.9	30.6	100	83	
Vert.	2544.976	AV	37.4	26.7	13.7	41.0	36.8	53.9	17.1	100	359	
Vert.	4882.000	AV	43.5	30.9	5.5	39.7	40.2	53.9	13.7	107	115	
Vert.	7323.000	AV	33.9	36.8	6.8	40.3	37.2	53.9	16.7	100	0	
Vert.	9764.000	AV	34.0	38.6	8.0	40.0	40.6	53.9	13.3	100	0	
Vert.	12205.000	AV	34.0	39.4	9.0	39.8	42.6	53.9	11.3	100	0	
Vert.	19523.990	AV	41.9	40.1	-2.5	45.6	33.9	53.9	20.0	100	83	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date December 10, 2014 December 11, 2014
 Temperature / Humidity 22 deg.C, 21 %RH 22 deg.C, 32 %RH
 Engineer Shinichi Takano Hikaru Shirasawa
 Mode Tx, 2480 MHz
 Tx, Bluetooth, BDR

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	432.001	QP	24.8	16.9	9.0	32.0	18.7	46.0	27.3	100	174	
Hori.	2483.500	PK	50.9	26.6	13.6	41.1	50.0	73.9	23.9	103	139	
Hori.	2584.010	PK	49.1	26.7	13.7	41.0	48.5	73.9	25.4	103	139	
Hori.	4960.000	PK	48.8	31.2	5.6	39.6	46.0	73.9	27.9	115	43	
Hori.	7440.000	PK	46.5	37.0	6.8	40.4	49.9	73.9	24.0	100	0	
Hori.	9920.000	PK	45.6	38.6	8.1	39.9	52.4	73.9	21.5	100	0	
Hori.	12400.000	PK	45.8	39.3	9.0	40.0	54.1	73.9	19.8	100	0	
Hori.	19836.030	PK	51.5	40.2	-2.5	45.7	43.5	73.9	30.4	100	134	
Hori.	2483.500	AV	39.4	26.6	13.6	41.1	38.5	53.9	15.4	103	139	
Hori.	2584.010	AV	40.3	26.7	13.7	41.0	39.7	53.9	14.2	103	139	
Hori.	4960.000	AV	41.5	31.2	5.6	39.6	38.7	53.9	15.2	115	43	
Hori.	7440.000	AV	35.3	37.0	6.8	40.4	38.7	53.9	15.2	100	0	
Hori.	9920.000	AV	34.5	38.6	8.1	39.9	41.3	53.9	12.6	100	0	
Hori.	12400.000	AV	34.5	39.3	9.0	40.0	42.8	53.9	11.1	100	0	
Hori.	19836.030	AV	42.8	40.2	-2.5	45.7	34.8	53.9	19.1	100	134	
Vert.	432.001	QP	23.3	16.9	9.0	32.0	17.2	46.0	28.8	270	281	
Vert.	2483.500	PK	49.8	26.6	13.6	41.1	48.9	73.9	25.0	100	140	
Vert.	2583.987	PK	48.2	26.7	13.7	41.0	47.6	73.9	26.3	100	140	
Vert.	4960.000	PK	51.3	31.2	5.6	39.6	48.5	73.9	25.4	108	112	
Vert.	7440.000	PK	46.7	37.0	6.8	40.4	50.1	73.9	23.8	100	0	
Vert.	9920.000	PK	45.9	38.6	8.1	39.9	52.7	73.9	21.2	100	0	
Vert.	12400.000	PK	46.3	39.3	9.0	40.0	54.6	73.9	19.3	100	0	
Vert.	19836.010	PK	50.7	40.2	-2.5	45.7	42.7	73.9	31.2	100	72	
Vert.	2483.500	AV	37.3	26.6	13.6	41.1	36.4	53.9	17.5	100	140	
Vert.	2583.987	AV	37.0	26.7	13.7	41.0	36.4	53.9	17.5	100	140	
Vert.	4960.000	AV	42.9	31.2	5.6	39.6	40.1	53.9	13.8	108	112	
Vert.	7440.000	AV	35.7	37.0	6.8	40.4	39.1	53.9	14.8	100	0	
Vert.	9920.000	AV	34.7	38.6	8.1	39.9	41.5	53.9	12.4	100	0	
Vert.	12400.000	AV	34.6	39.3	9.0	40.0	42.9	53.9	11.0	100	0	
Vert.	19836.010	AV	42.4	40.2	-2.5	45.7	34.4	53.9	19.5	100	72	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date December 10, 2014 December 11, 2014
 Temperature / Humidity 22 deg.C, 21 %RH 22 deg.C, 32 %RH
 Engineer Shinichi Takano Hikaru Shirasawa
 Mode Tx, 2402 MHz
 Tx, Bluetooth, EDR

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	431.999	QP	24.4	16.9	9.0	32.0	18.3	46.0	27.7	100	174	
Hori.	2390.000	PK	46.6	26.4	13.6	41.1	45.5	73.9	28.4	140	145	
Hori.	2558.044	PK	49.3	26.7	13.7	41.0	48.7	73.9	25.2	140	145	
Hori.	4804.000	PK	49.2	30.6	5.5	39.8	45.5	73.9	28.4	100	118	
Hori.	7206.000	PK	46.2	36.6	6.9	40.2	49.5	73.9	24.4	100	0	
Hori.	9608.000	PK	46.4	38.5	7.9	40.1	52.7	73.9	21.2	100	0	
Hori.	12010.000	PK	46.9	39.5	8.9	39.6	55.7	73.9	18.2	100	0	
Hori.	19220.000	PK	49.3	40.1	-2.6	45.3	41.5	73.9	32.4	100	125	
Hori.	2390.000	AV	34.0	26.4	13.6	41.1	32.9	53.9	21.0	140	145	
Hori.	2558.044	AV	40.7	26.7	13.7	41.0	40.1	53.9	13.8	140	145	
Hori.	4804.000	AV	39.3	30.6	5.5	39.8	35.6	53.9	18.3	100	118	
Hori.	7206.000	AV	34.2	36.6	6.9	40.2	37.5	53.9	16.4	100	0	
Hori.	9608.000	AV	34.4	38.5	7.9	40.1	40.7	53.9	13.2	100	0	
Hori.	12010.000	AV	35.0	39.5	8.9	39.6	43.8	53.9	10.1	100	0	
Hori.	19220.000	AV	42.2	40.1	-2.6	45.3	34.4	53.9	19.5	100	125	
Vert.	431.999	QP	23.1	16.9	9.0	32.0	17.0	46.0	29.0	100	288	
Vert.	2390.000	PK	46.7	26.4	13.6	41.1	45.6	73.9	28.3	100	340	
Vert.	2558.024	PK	48.0	26.7	13.7	41.0	47.4	73.9	26.5	100	340	
Vert.	4804.000	PK	49.8	30.6	5.5	39.8	46.1	73.9	27.8	100	115	
Vert.	7206.000	PK	45.7	36.6	6.9	40.2	49.0	73.9	24.9	100	0	
Vert.	9608.000	PK	45.4	38.5	7.9	40.1	51.7	73.9	22.2	100	0	
Vert.	12010.000	PK	46.2	39.5	8.9	39.6	55.0	73.9	18.9	100	0	
Vert.	19220.000	PK	50.1	40.1	-2.6	45.3	42.3	73.9	31.6	100	89	
Vert.	2390.000	AV	33.9	26.4	13.6	41.1	32.8	53.9	21.1	100	340	
Vert.	2558.024	AV	36.9	26.7	13.7	41.0	36.3	53.9	17.6	100	340	
Vert.	4804.000	AV	39.3	30.6	5.5	39.8	35.6	53.9	18.3	100	115	
Vert.	7206.000	AV	34.2	36.6	6.9	40.2	37.5	53.9	16.4	100	0	
Vert.	9608.000	AV	34.4	38.5	7.9	40.1	40.7	53.9	13.2	100	0	
Vert.	12010.000	AV	34.8	39.5	8.9	39.6	43.6	53.9	10.3	100	0	
Vert.	19220.000	AV	41.9	40.1	-2.6	45.3	34.1	53.9	19.8	100	89	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)
 Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	99.6	26.4	13.6	41.1	98.5	-	-	Carrier
Hori.	2400.000	PK	50.4	26.4	13.6	41.1	49.3	78.5	29.2	
Vert.	2402.000	PK	98.1	26.4	13.6	41.1	97.0	-	-	Carrier
Vert.	2400.000	PK	49.3	26.4	13.6	41.1	48.2	77.0	28.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)
 Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date December 10, 2014 December 11, 2014
 Temperature / Humidity 22 deg.C, 21 %RH 22 deg.C, 32 %RH
 Engineer Shinichi Takano Hikaru Shirasawa
 Mode Tx, 2441 MHz
 Tx, Bluetooth, EDR

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	432.002	QP	24.3	16.9	9.0	32.0	18.2	46.0	27.8	100	165	
Hori.	2544.456	PK	50.0	26.7	13.7	41.0	49.4	73.9	24.5	103	141	
Hori.	4882.000	PK	49.1	30.9	5.5	39.7	45.8	73.9	28.1	100	127	
Hori.	7323.000	PK	44.7	36.8	6.8	40.3	48.0	73.9	25.9	100	0	
Hori.	9764.000	PK	44.7	38.6	8.0	40.0	51.3	73.9	22.6	100	0	
Hori.	12205.000	PK	45.8	39.4	9.0	39.8	54.4	73.9	19.5	100	0	
Hori.	19524.030	PK	51.5	40.1	-2.5	45.6	43.5	73.9	30.4	100	118	
Hori.	2544.456	AV	39.8	26.7	13.7	41.0	39.2	53.9	14.7	103	141	
Hori.	4882.000	AV	38.8	30.9	5.5	39.7	35.5	53.9	18.4	100	127	
Hori.	7323.000	AV	34.1	36.8	6.8	40.3	37.4	53.9	16.5	100	0	
Hori.	9764.000	AV	33.8	38.6	8.0	40.0	40.4	53.9	13.5	100	0	
Hori.	12205.000	AV	34.1	39.4	9.0	39.8	42.7	53.9	11.2	100	0	
Hori.	19524.030	AV	43.3	40.1	-2.5	45.6	35.3	53.9	18.6	100	118	
Vert.	432.002	QP	22.9	16.9	9.0	32.0	16.8	46.0	29.2	235	281	
Vert.	2544.994	PK	47.3	26.7	13.7	41.0	46.7	73.9	27.2	100	342	
Vert.	4882.000	PK	49.9	30.9	5.5	39.7	46.6	73.9	27.3	100	106	
Vert.	7323.000	PK	45.9	36.8	6.8	40.3	49.2	73.9	24.7	100	0	
Vert.	9764.000	PK	46.0	38.6	8.0	40.0	52.6	73.9	21.3	100	0	
Vert.	12205.000	PK	45.7	39.4	9.0	39.8	54.3	73.9	19.6	100	0	
Vert.	19523.970	PK	50.2	40.1	-2.5	45.6	42.2	73.9	31.7	100	83	
Vert.	2544.994	AV	36.3	26.7	13.7	41.0	35.7	53.9	18.2	100	342	
Vert.	4882.000	AV	39.9	30.9	5.5	39.7	36.6	53.9	17.3	100	106	
Vert.	7323.000	AV	34.0	36.8	6.8	40.3	37.3	53.9	16.6	100	0	
Vert.	9764.000	AV	33.9	38.6	8.0	40.0	40.5	53.9	13.4	100	0	
Vert.	12205.000	AV	34.0	39.4	9.0	39.8	42.6	53.9	11.3	100	0	
Vert.	19523.970	AV	42.4	40.1	-2.5	45.6	34.4	53.9	19.5	100	83	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

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Radiated Emission

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 Date December 10, 2014 December 11, 2014
 Temperature / Humidity 22 deg.C, 21 %RH 22 deg.C, 32 %RH
 Engineer Shinichi Takano Hikaru Shirasawa
 Mode Tx, 2480 MHz
 Tx, Bluetooth, EDR

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	431.999	QP	24.4	16.9	9.0	32.0	18.3	46.0	27.7	100	165	
Hori.	2483.500	PK	50.9	26.6	13.6	41.1	50.0	73.9	23.9	124	140	
Hori.	2583.978	PK	48.9	26.7	13.7	41.0	48.3	73.9	25.6	124	140	
Hori.	4960.000	PK	47.9	31.2	5.6	39.6	45.1	73.9	28.8	100	48	
Hori.	7440.000	PK	46.0	37.0	6.8	40.4	49.4	73.9	24.5	100	0	
Hori.	9920.000	PK	44.7	38.6	8.1	39.9	51.5	73.9	22.4	100	0	
Hori.	12400.000	PK	44.9	39.3	9.0	40.0	53.2	73.9	20.7	100	0	
Hori.	19835.990	PK	51.3	40.2	-2.5	45.7	43.3	73.9	30.6	100	127	
Hori.	2483.500	AV	37.1	26.6	13.6	41.1	36.2	53.9	17.7	124	140	
Hori.	2583.978	AV	38.7	26.7	13.7	41.0	38.1	53.9	15.8	124	140	
Hori.	4960.000	AV	37.5	31.2	5.6	39.6	34.7	53.9	19.2	100	48	
Hori.	7440.000	AV	34.0	37.0	6.8	40.4	37.4	53.9	16.5	100	0	
Hori.	9920.000	AV	33.1	38.6	8.1	39.9	39.9	53.9	14.0	100	0	
Hori.	12400.000	AV	33.0	39.3	9.0	40.0	41.3	53.9	12.6	100	0	
Hori.	19835.990	AV	43.3	40.2	-2.5	45.7	35.3	53.9	18.6	100	127	
Vert.	432.001	QP	22.9	16.9	9.0	32.0	16.8	46.0	29.2	287	279	
Vert.	2483.500	PK	50.6	26.6	13.6	41.1	49.7	73.9	24.2	100	202	
Vert.	2584.022	PK	47.0	26.7	13.7	41.0	46.4	73.9	27.5	100	202	
Vert.	4960.000	PK	49.1	31.2	5.6	39.6	46.3	73.9	27.6	104	111	
Vert.	7440.000	PK	45.0	37.0	6.8	40.4	48.4	73.9	25.5	100	0	
Vert.	9920.000	PK	43.8	38.6	8.1	39.9	50.6	73.9	23.3	100	0	
Vert.	12400.000	PK	44.4	39.3	9.0	40.0	52.7	73.9	21.2	100	0	
Vert.	19836.040	PK	51.0	40.2	-2.5	45.7	43.0	73.9	30.9	100	80	
Vert.	2483.500	AV	38.9	26.6	13.6	41.1	38.0	53.9	15.9	100	202	
Vert.	2584.022	AV	36.6	26.7	13.7	41.0	36.0	53.9	17.9	100	202	
Vert.	4960.000	AV	38.9	31.2	5.6	39.6	36.1	53.9	17.8	104	111	
Vert.	7440.000	AV	33.8	37.0	6.8	40.4	37.2	53.9	16.7	100	0	
Vert.	9920.000	AV	33.1	38.6	8.1	39.9	39.9	53.9	14.0	100	0	
Vert.	12400.000	AV	32.9	39.3	9.0	40.0	41.2	53.9	12.7	100	0	
Vert.	19836.040	AV	42.6	40.2	-2.5	45.7	34.6	53.9	19.3	100	80	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

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

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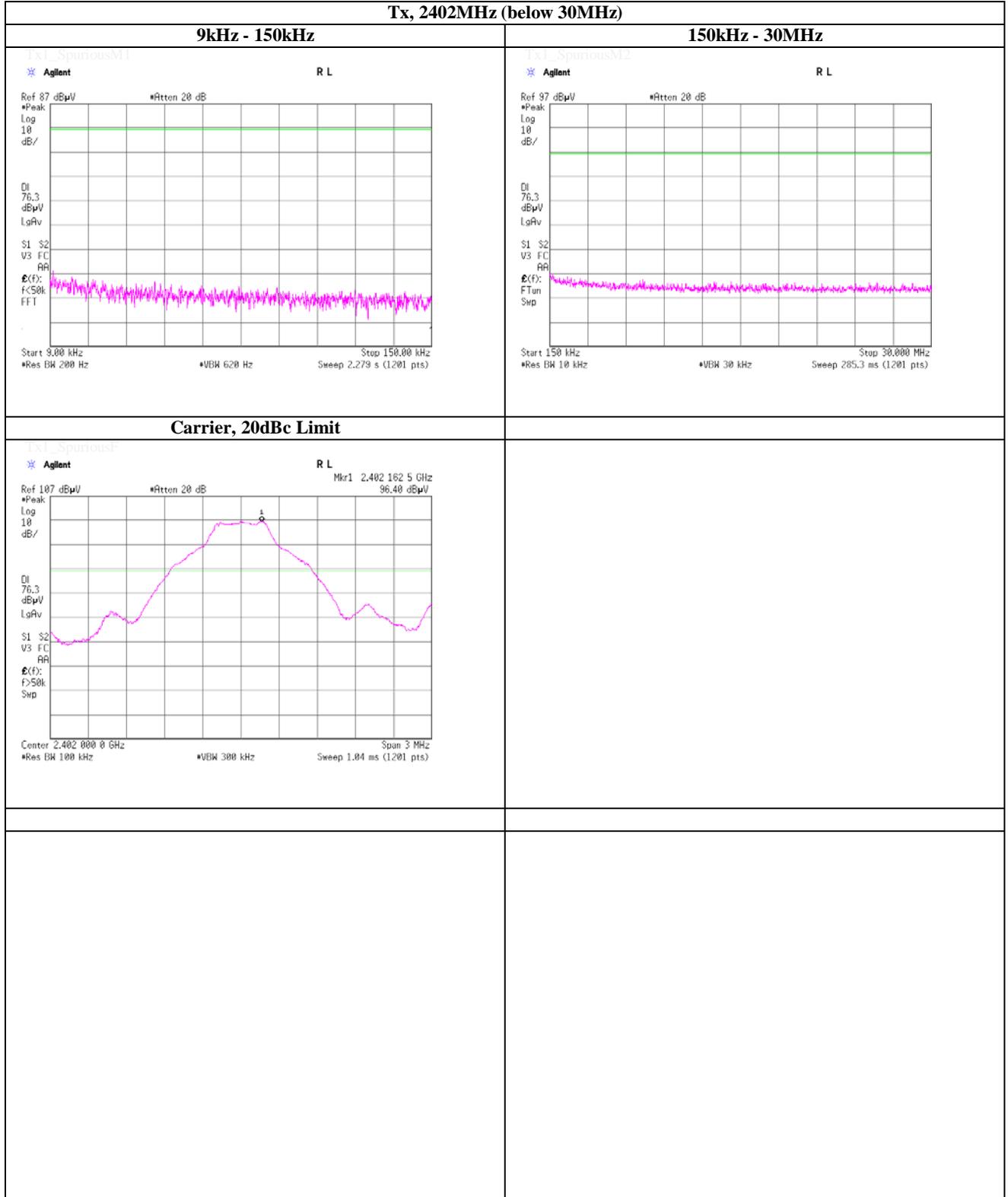
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (below 30MHz)



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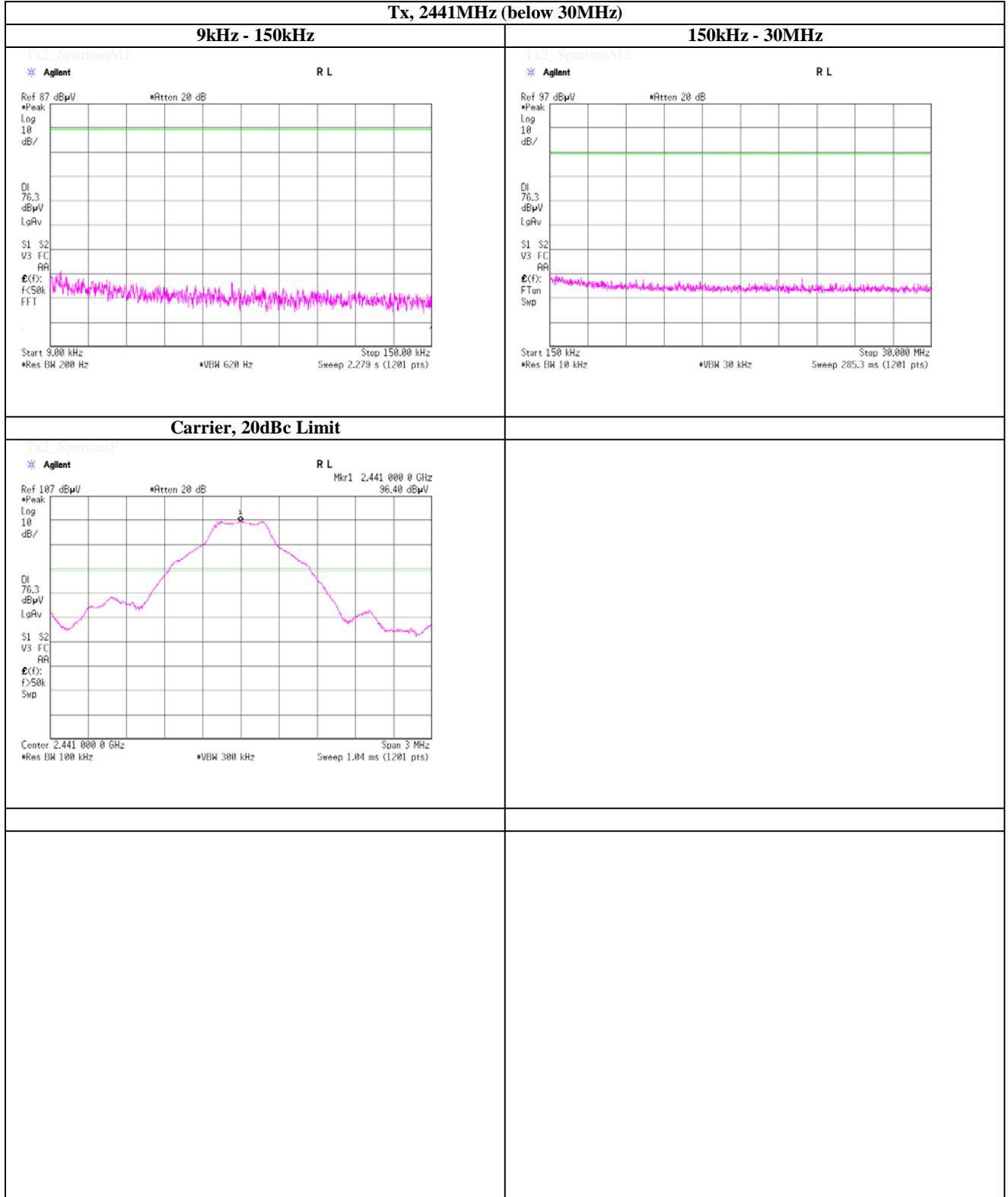
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (below 30MHz)



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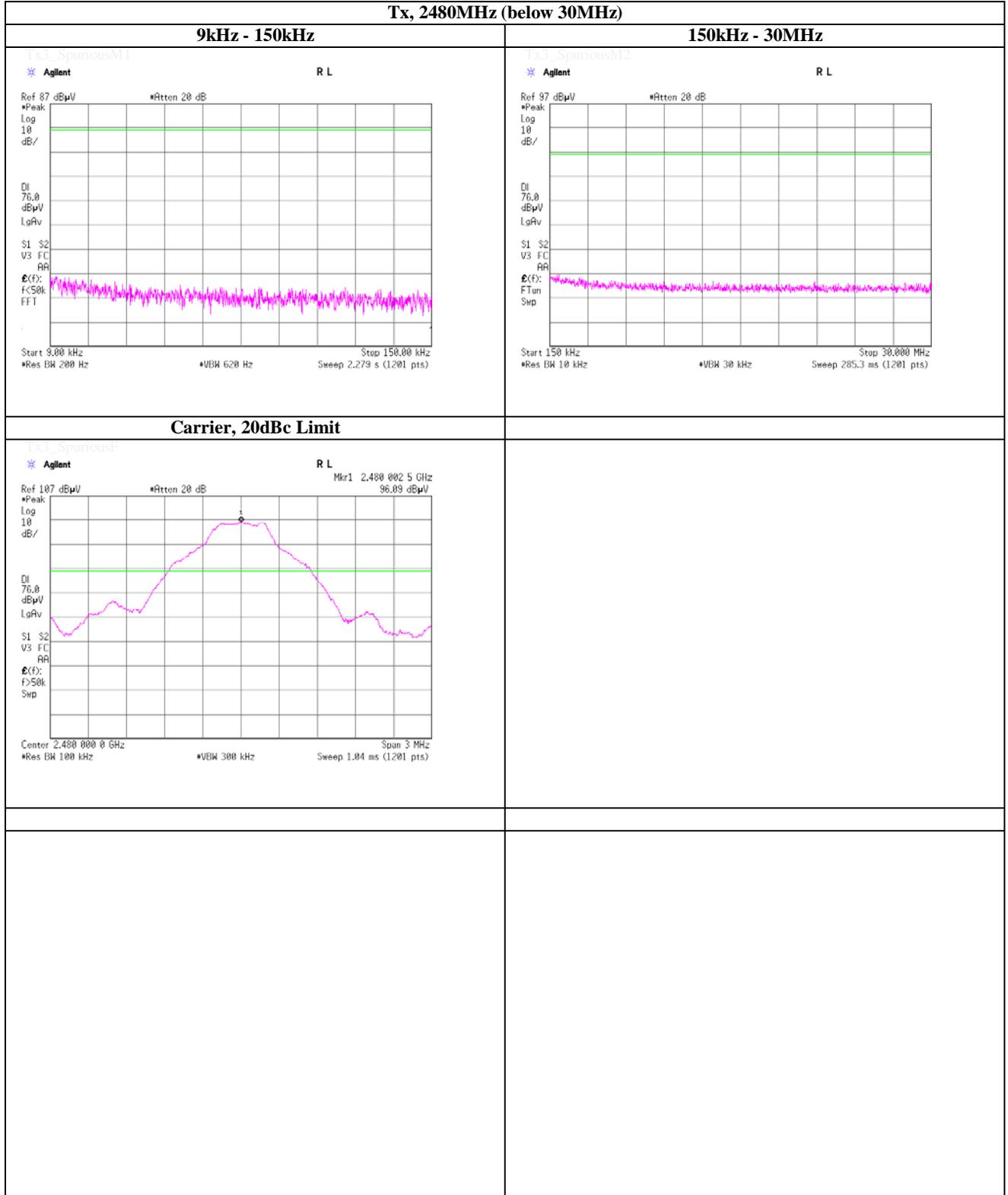
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (below 30MHz)



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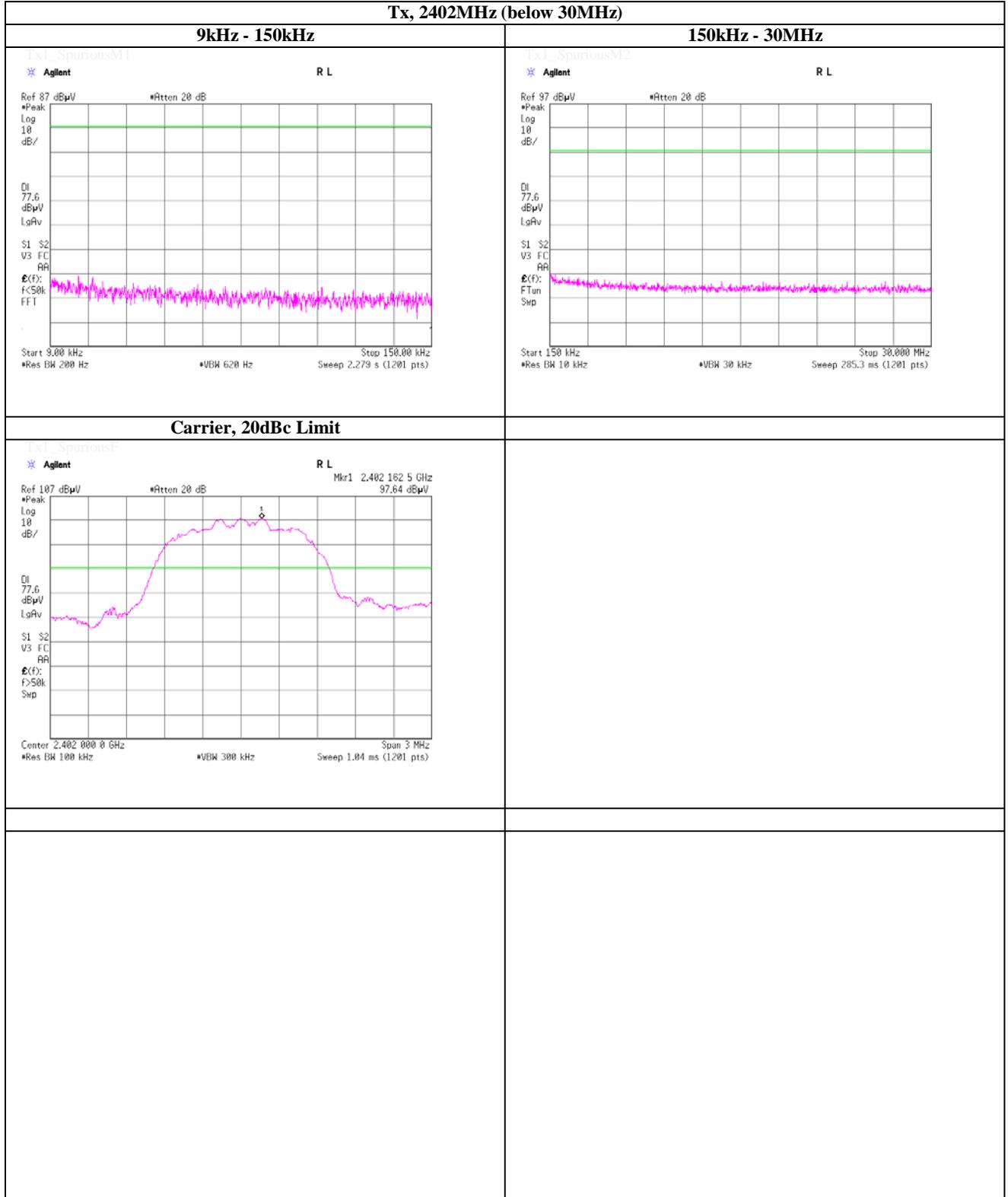
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

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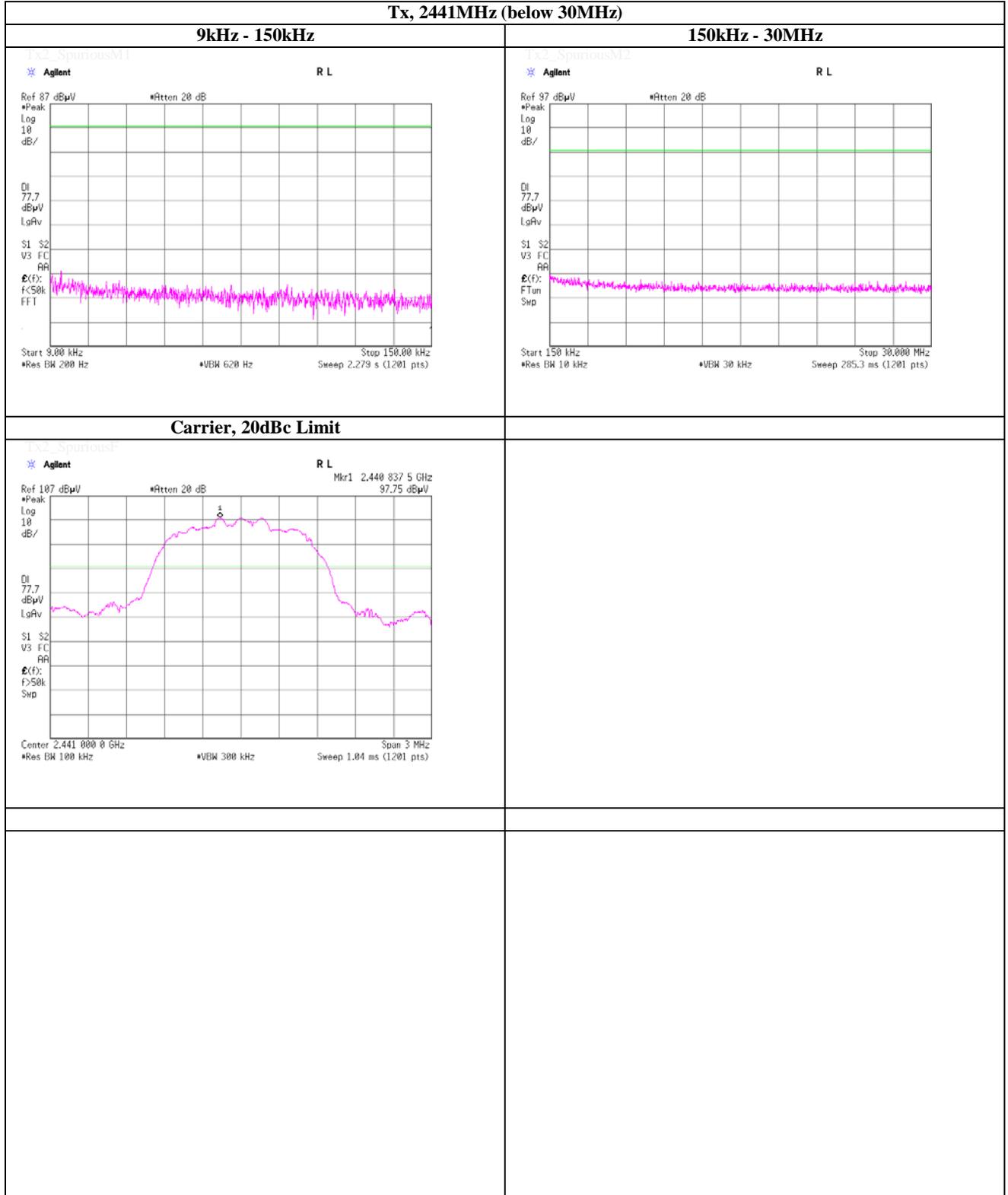
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (below 30MHz)



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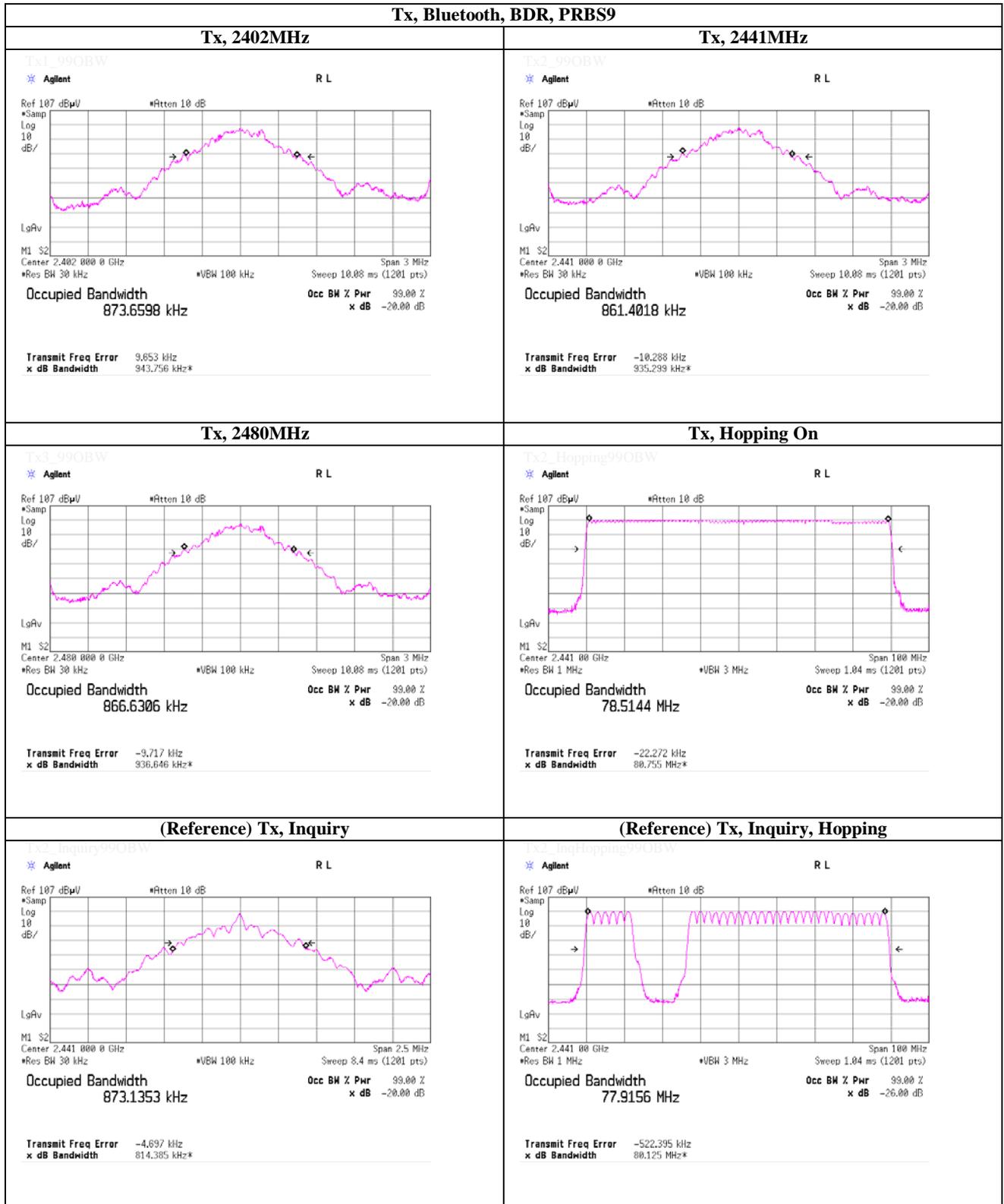
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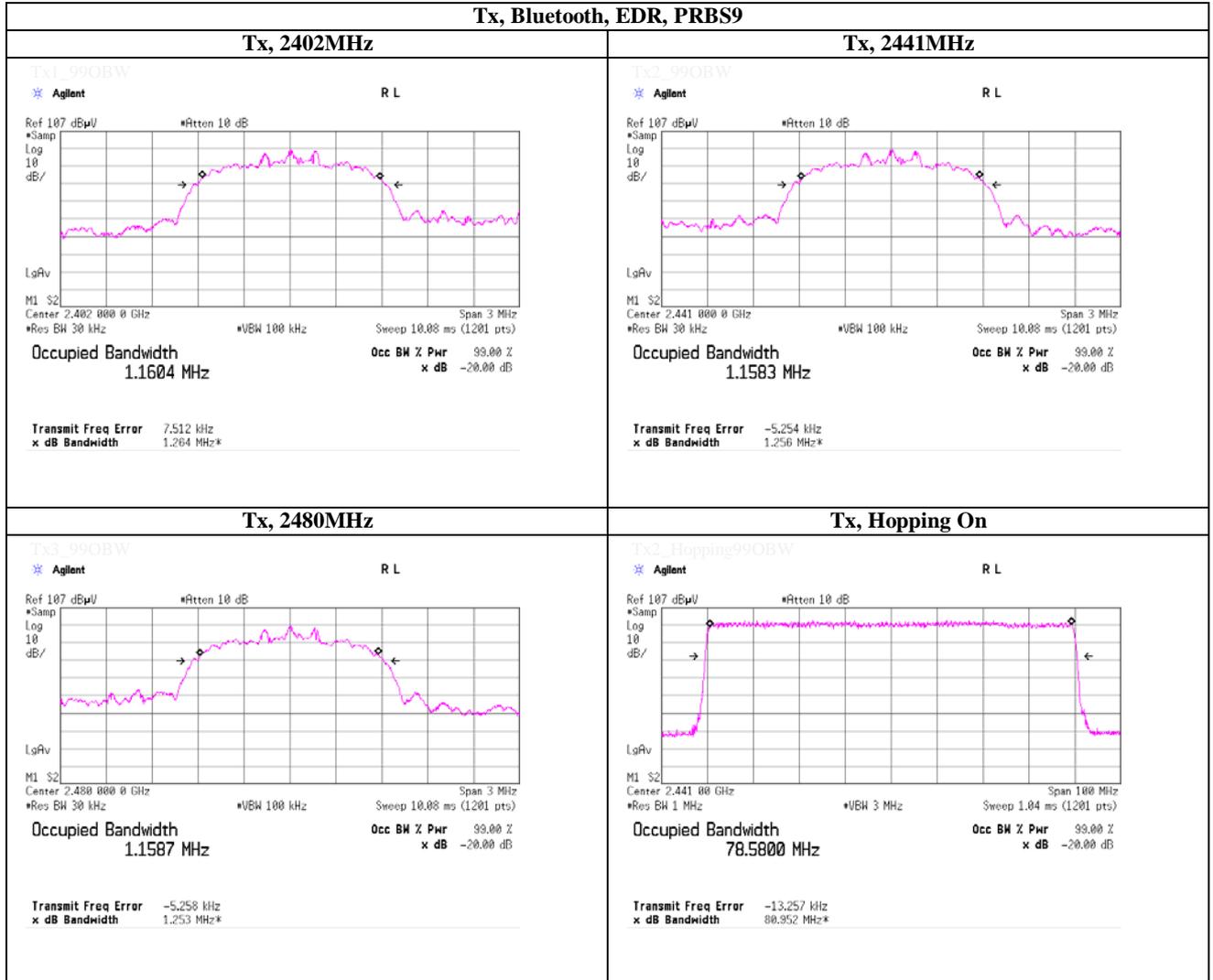
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99% Occupied Bandwidth



99% Occupied Bandwidth



Tx2_Inquiry99OBW

Tx2_InqHopping99OBW

APPENDIX 2 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2014/07/14 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2014/05/23 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-01 8	RE	2014/06/24 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2014/05/15 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2014/08/12 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/10/30 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2014/03/17 * 12
SJM-15	Measure	ASKUL	-	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,MF)	-	RE	-
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2014/11/21 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2014/04/22 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2014/02/03 * 12
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2014/04/22 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2014/03/14 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2014/04/04 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2014/04/04 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2014/02/14 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2014/10/18 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2014/04/25 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2014/10/18 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2014/03/04 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2014/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2014/05/15 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	RE	2014/04/07 * 12
SCC-G18	Coaxial Cable	Suhner	SUCOFLEX 104A	46292/4A	RE	2014/03/14 * 12

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .

Test Item :

- CE: Conducted emission ,
- RE: Radiated emission ,
- AT: Antenna terminal conducted test