



# RADIO TEST REPORT

**Test Report No.: 10036661S**

**Applicant** : Sony Corporation  
**Type of Equipment** : FM/AM Digital Media Player  
**Model No.** : DSX-A55BT  
**FCC ID** : AK8DSXA55BT  
**Test regulation** : FCC Part15 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 limits of the above regulation.
4. The test results in this test 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 any agency of the Federal Government.
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:** July 31 to August 2, 2013

**Tested by:**

Akio Hayashi  
Engineer of WiSE Japan,  
UL Verification Service

**Approved by :**

Toyokazu Imamura  
Leader of WiSE Japan,  
UL Verification Service



**JAB**  
Testing  
RTL02610

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 There is no testing item of "Non-accreditation".

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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : Sony Corporation  
Address : Sony City Osaki, 2-10-1 Osaki, Shinagawa-ku, Tokyo 141-8610 Japan  
Telephone Number : +81 50 3750 7634  
Facsimile Number : +81 50 3750 6574  
Contact Person : Toshihiro Maeda

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

### **2.1 Identification of E.U.T.**

Type of Equipment : FM/AM Digital Media Player  
Model Number : DSX-A55BT  
Serial Number : Refer to 4.2 of this report.  
Rating : DC12V  
Country of Mass-production : Thailand  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Receipt Date of Sample : July 26, 2013  
Modification of EUT : No modification by the test lab.

### **2.2 Product description**

Model: DSX-A55BT (referred to as the EUT in this report) is a FM/AM Digital Media Player.

Clock frequency(ies) in the system : 32.768kHz, 7.92MHz, 12MHz, 24MHz, 36.48MHz

<Radio part>

Equipment type : Transceiver  
Frequency of operation : 2402-2480MHz  
Bandwidth & channel spacing : 79MHz & 1MHz  
Type of modulation : FHSS  
Operation temperature range : -20 to +60 deg.C.  
Antenna type : Meander Monopole  
Antenna connector type : None  
Antenna gain : Average: -3.95dBi, Peak: -1.18dBi  
ITU code : F1D, G1D

FCC 15.31 (e)

The equipment provides the wireless transmitter with stable power supply (DC3.3V). Therefore, the equipment 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: 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 15.209 Radiated emission limits, general requirements  
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,  
and 5725-5850MHz

The EUT has been tested for compliance with FCC Part 15 Subpart B by the customer.

#### **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		9.0dB Freq.: 1601.994MHz Polarization: Vertical Detection: Average 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.

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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 4.6.1	-	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 <sup>*1</sup> /SR <sup>*2</sup> (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
<b>Radiated emission</b> (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	4.9 dB
	300MHz-1GHz	5.0 dB	5.2 dB	4.9 dB
	1GHz-15GHz	4.8 dB	4.8 dB	4.9 dB
<b>Radiated emission</b> (Measurement distance: 1m)	15GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.6 dB	4.3 dB	4.4 dB

\*1: SAC=Semi-Anechoic Chamber

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

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

#### Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 1.5dB

Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.7dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.9dB

Bandwidth measurement uncertainty for this test was: (±) 5.4%

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### 3.5 Test location

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	FCC Registration No.	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	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 semi-anechoic chamber	697847	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	697847	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	-

### 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**

<b>Test item</b>	<b>Operating mode</b>	<b>Tested frequency</b>
Carrier frequency separation	Transmitting Hopping ON (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	-
20dB bandwidth	Transmitting Hopping OFF (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Number of hopping frequency	Transmitting Hopping ON (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	-
Dwell time	Transmitting (Hopping ON), Payload: PRBS9 - DH1, - DH3, - DH5 - 3-DH1, - 3-DH3, - 3-DH5 ----- -Inquiry	-
Maximum peak output power	Transmitting Hopping OFF, Payload: PRBS9 - DH5, - 2-DH5, - 3-DH5	2402MHz, 2441MHz, 2480MHz
Band edge compliance & Spurious emission (Conducted)	Transmitting (DH5 / 3-DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	Band edge compliance: 2402MHz, 2480MHz
(Radiated)	Transmitting (DH5 / 3-DH5), Payload: PRBS9 -Hopping OFF	Spurious emission: 2402MHz, 2441MHz, 2480MHz
99% occupied bandwidth	Transmitting (DH5 / 3-DH5), Payload: PRBS9 / Inquiry -Hopping ON -Hopping OFF	2402MHz, 2441MHz, 2480MHz

\*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload (except Dwell time test).

\*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not affect 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.

Software: CSR Blue Test Ver.1.2.4  
Power Settings: BDR = 44  
EDR = 48

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

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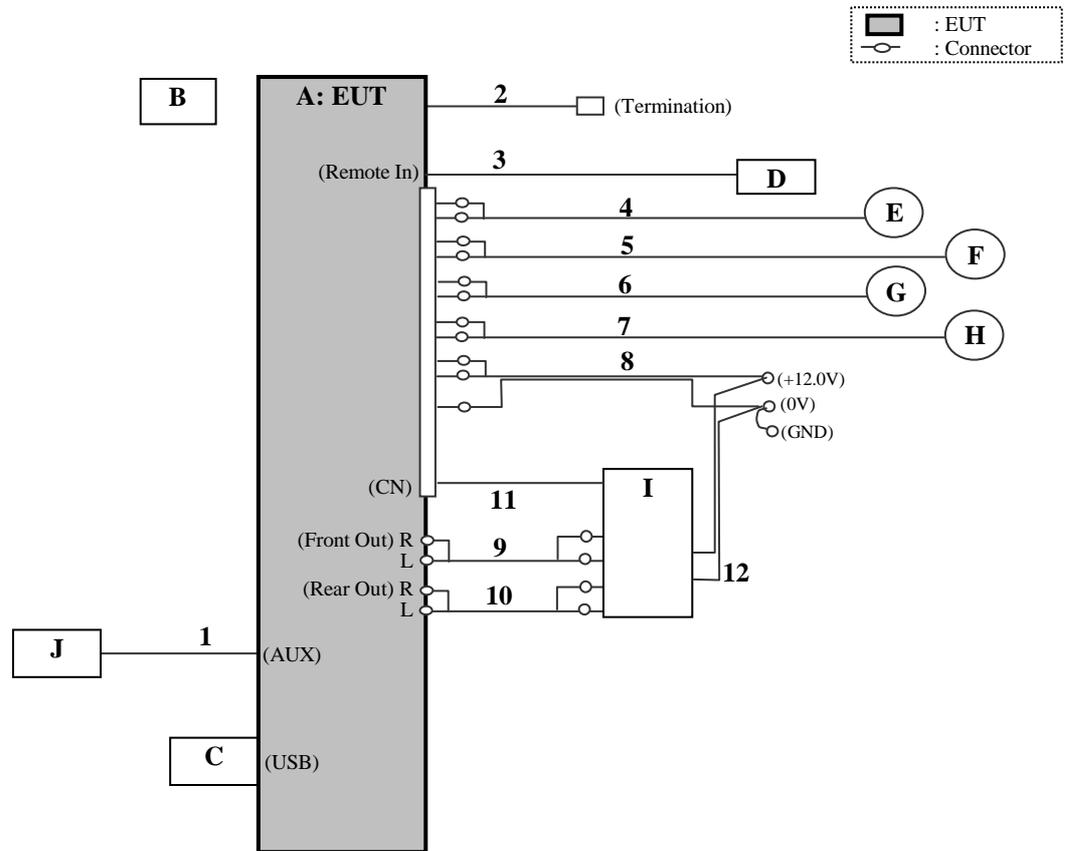
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## 4.2 Configuration and peripherals



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

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**Description of EUT and support equipment**

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	FM/AM Digital Media Player	DSX-A55BT	*1)	Sony	EUT
B	Remote Commander	RM-X231	-	Sony	-
C	USB Memory	SDK-USM4GL(B)	10615MEDB	Sony	-
D	Wired Remote Controller	RM-X4S	-	Sony	-
E	Speaker 1	XS-F1611	-	Sony	-
F	Speaker 2	XS-F1611	-	Sony	-
G	Speaker 3	1-544-814-31	-	AIWA	-
H	Speaker 4	1-544-814-31	-	AIWA	-
I	Stereo Power Amplifier	XM-423SL	0020316	Sony	-
J	Digital Media Player	NW-A829	5017289	Sony	-

\*1) 15: Antenna terminal conducted tests, 16: Radiated emission tests

**List of cables used**

No.	Name	Length (m)	Shield- Cable	Shield- Connector	Remarks
1	AUX	5.0	Shielded	Shielded	-
2	FM antenna	1.5	Shielded	Shielded	-
3	REMOTE IN	2.0	Shielded	Shielded	-
4	Speaker (1)	0.25+2.0	Unshielded	Unshielded	-
5	Speaker (2)	0.25+2.0	Unshielded	Unshielded	-
6	Speaker (3)	0.25+2.0	Unshielded	Unshielded	-
7	Speaker (4)	0.25+2.0	Unshielded	Unshielded	-
8	DC Power	0.25+1.0	Unshielded	Unshielded	-
9	RCA (Front Audio Out)	5.0	Shielded	Shielded	-
10	RCA (Rear Audio Out)	5.0	Shielded	Shielded	-
11	REM Out	0.25+0.5	Unshielded	Unshielded	-
12	DC Power	0.6+0.8	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, 1.0m by 2.0m, 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	1 - 25GHz		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 mounting angle of -5 to 20 deg. based on the product specification to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization \ Test item	Carrier	Spurious emission (Below 1GHz)	Spurious emission (1-15GHz)	Spurious emission (Above 15GHz)
Horizontal	0 deg.	0 deg.	-5 deg.	0 deg.
Vertical	0 deg.	0 deg.	0 deg.	0 deg.

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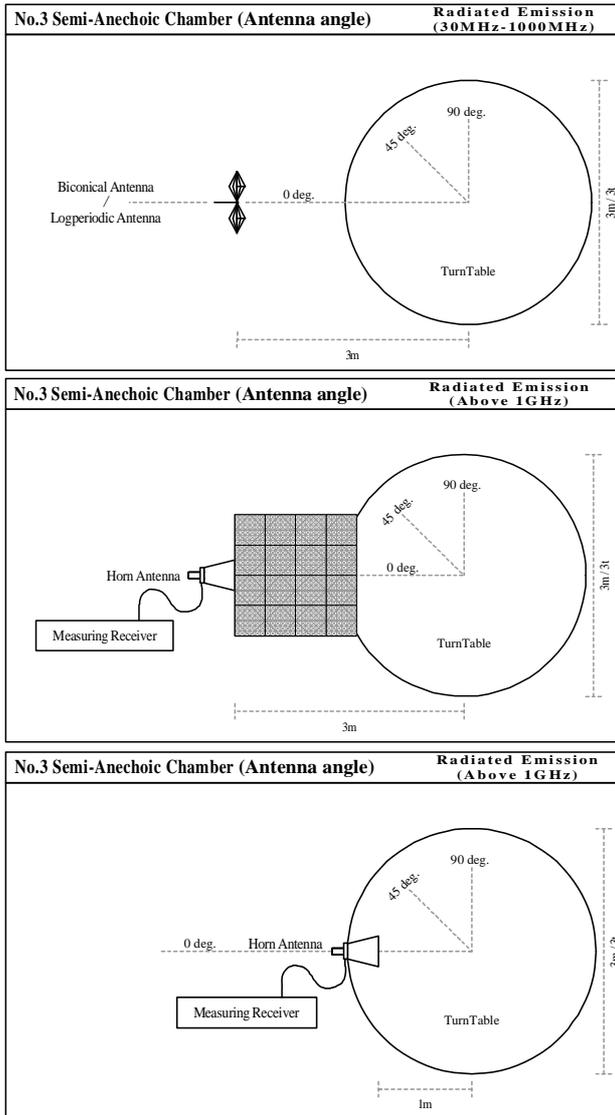
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**Figure 1. Antenna angle**



**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 3<sup>rd</sup> 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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## APPENDIX 1: Data of Radio tests

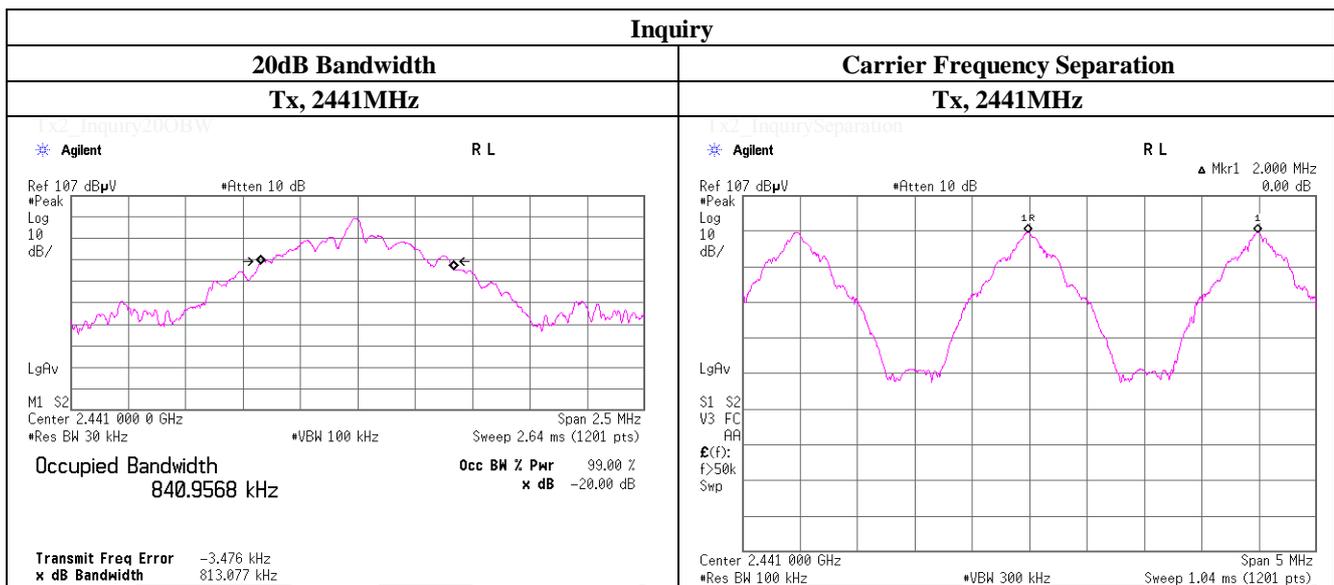
### 20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	August 1, 2013	
Temperature / Humidity	24 deg.C , 69 %RH	
Engineer	Shinichi Takano	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.931	1.000	>= 0.620
DH5	2441.0	0.948	1.000	>= 0.632
DH5	2480.0	0.928	1.000	>= 0.619
Inquiry	2441.0	0.813	2.000	>= 0.542

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

No limit applies to 20dB Bandwidth.



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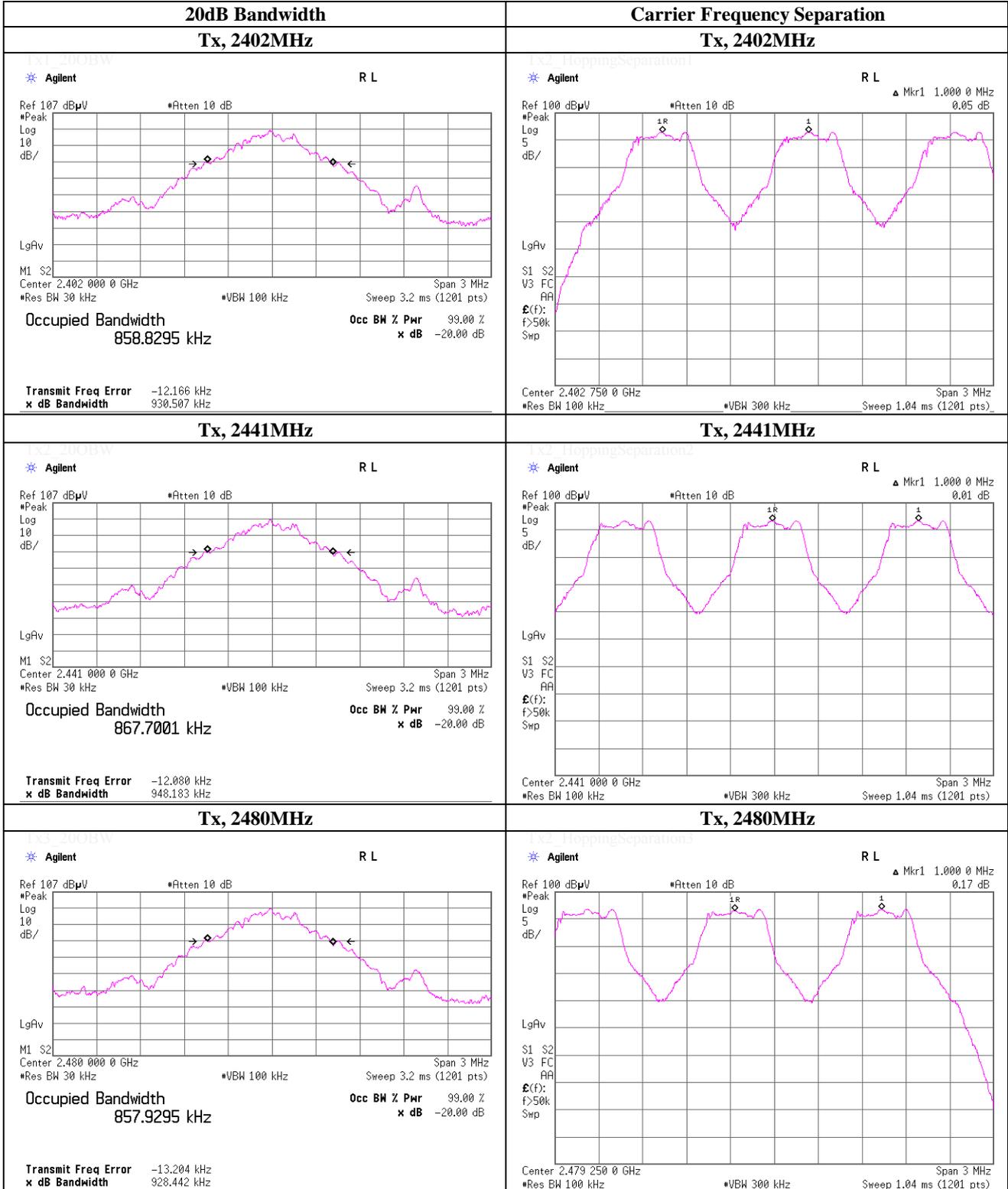
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## 20dB Bandwidth and Carrier Frequency Separation

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                            August 1, 2013  
 Temperature / Humidity    24 deg.C       , 69 %RH  
 Engineer                     Shinichi Takano  
 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	1.265	1.000	>= 0.843
3-DH5	2441.0	1.270	1.000	>= 0.847
3-DH5	2480.0	1.294	1.000	>= 0.862

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

No limit applies to 20dB Bandwidth.

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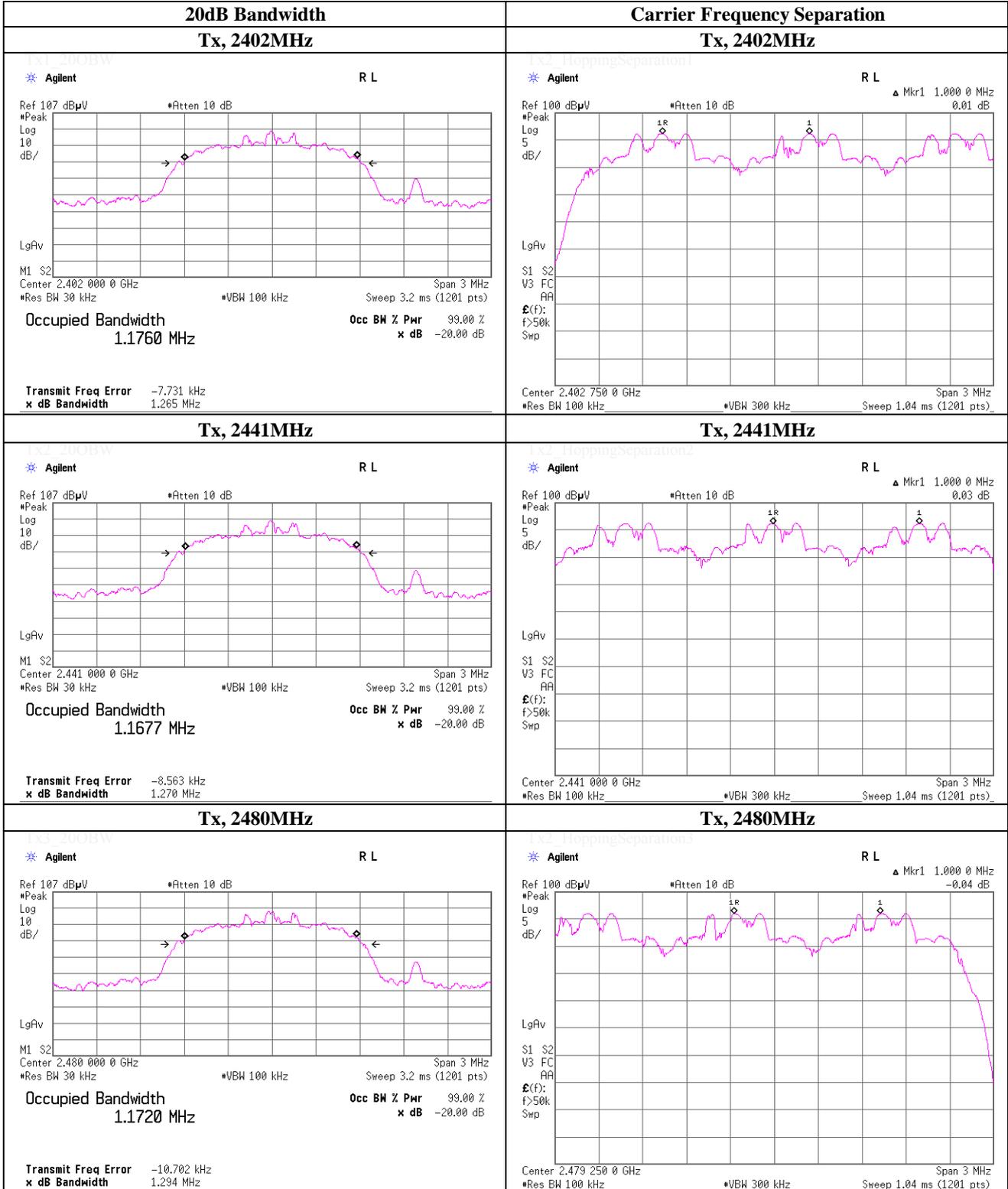
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## 20dB Bandwidth and Carrier Frequency Separation

### Tx, Bluetooth, EDR, PRBS9



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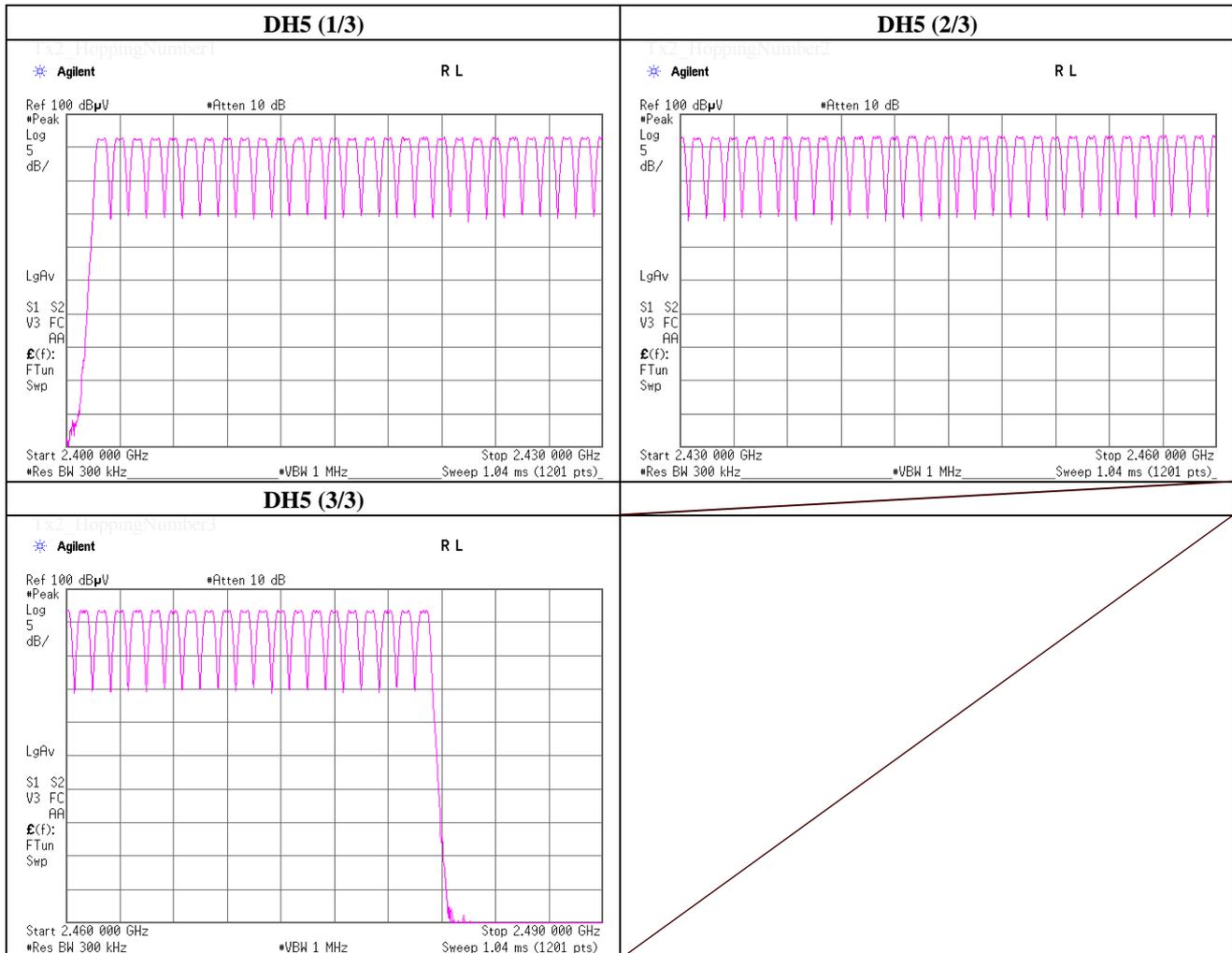
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### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	August 1, 2013	
Temperature / Humidity	24 deg.C , 69 %RH	
Engineer	Shinichi Takano	
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.



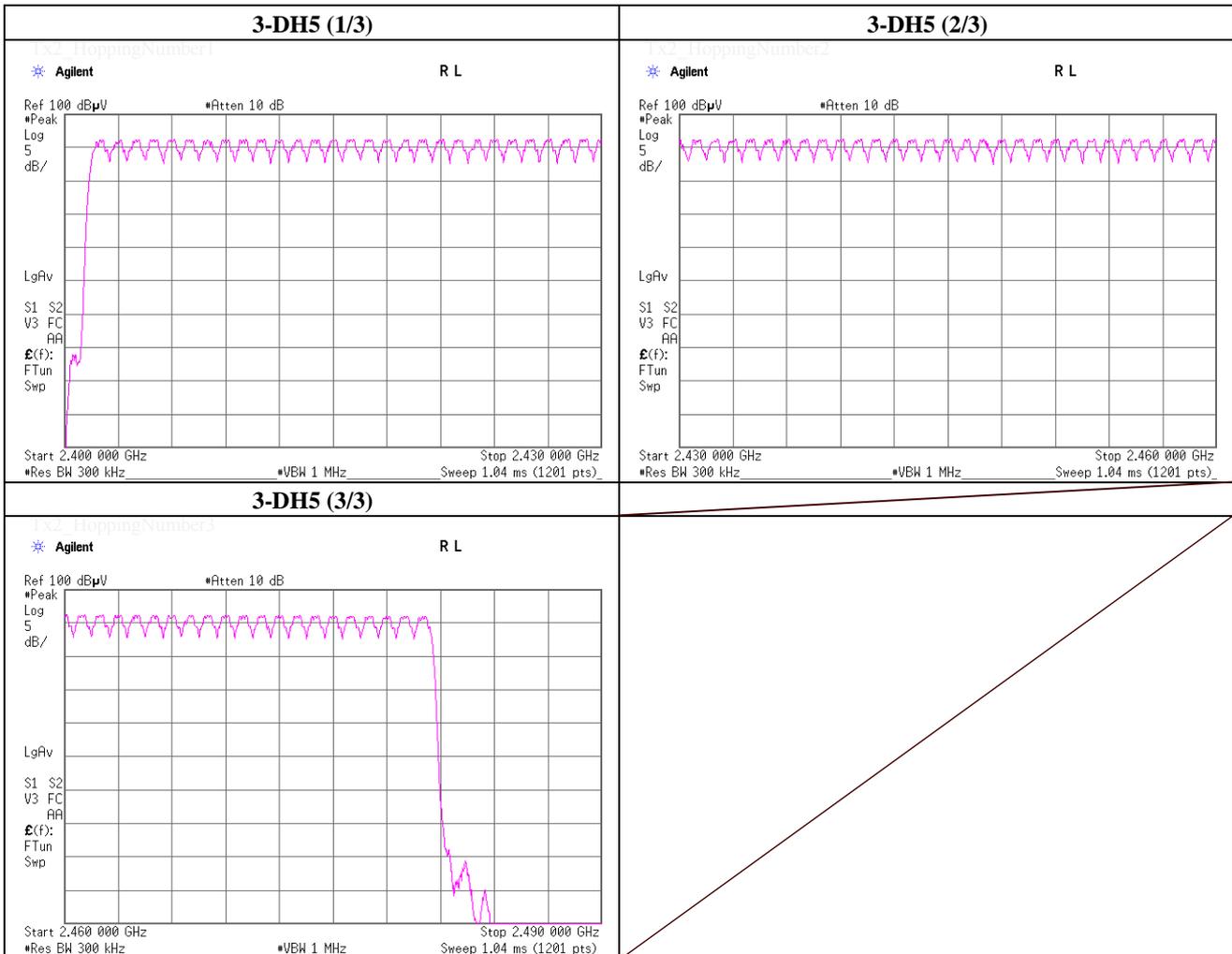
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**Shonan EMC Lab.**  
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN  
 Telephone : +81 463 50 6400  
 Facsimile : +81 463 50 6401

**Number of Hopping Frequency**

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	August 1, 2013	
Temperature / Humidity	24 deg.C , 69 %RH	
Engineer	Shinichi Takano	
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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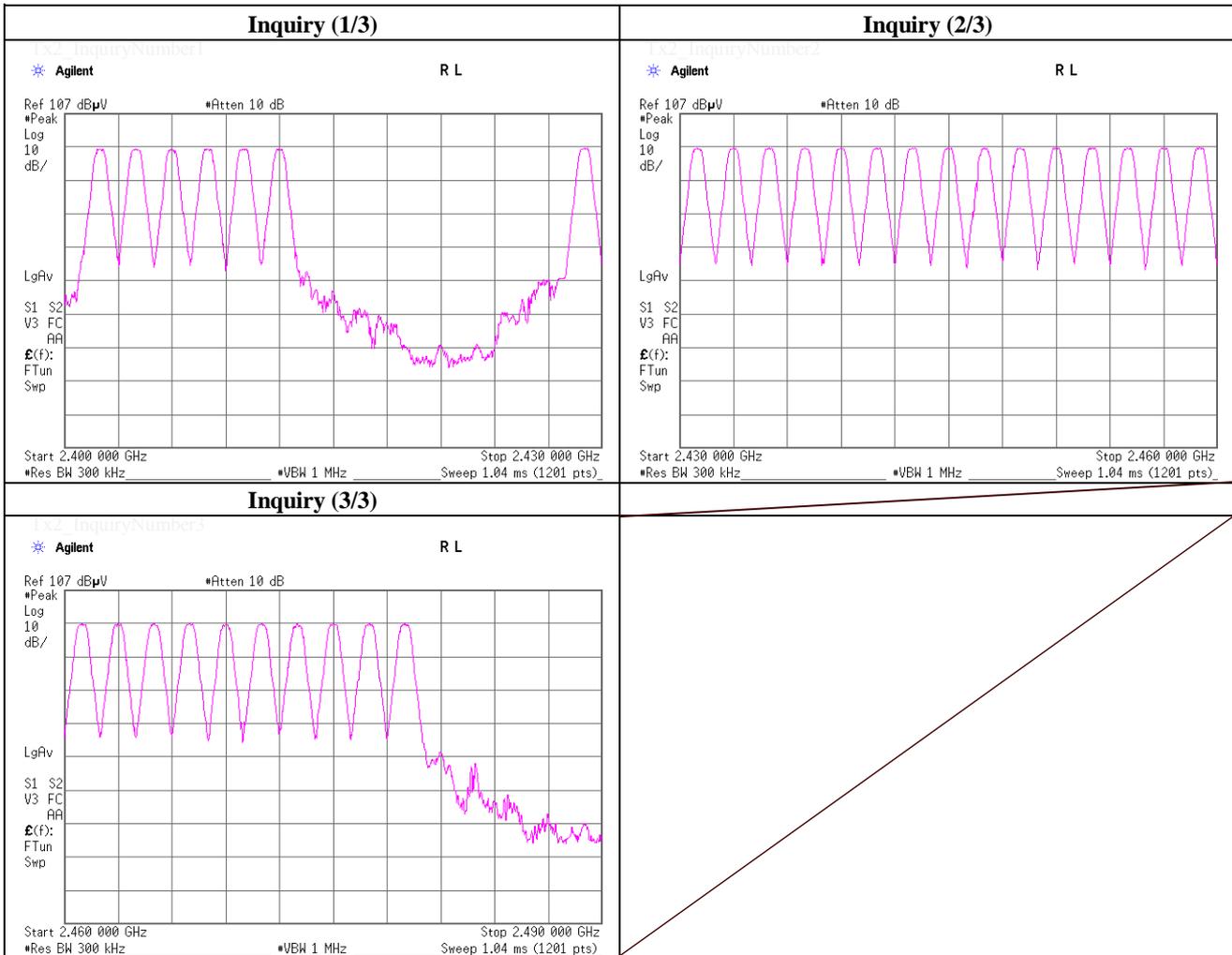
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**Number of Hopping Frequency**

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	August 1, 2013	
Temperature / Humidity	24 deg.C , 69 %RH	
Engineer	Shinichi Takano	
Mode	Tx, Bluetooth, Inquiry	

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



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## Dwell Time

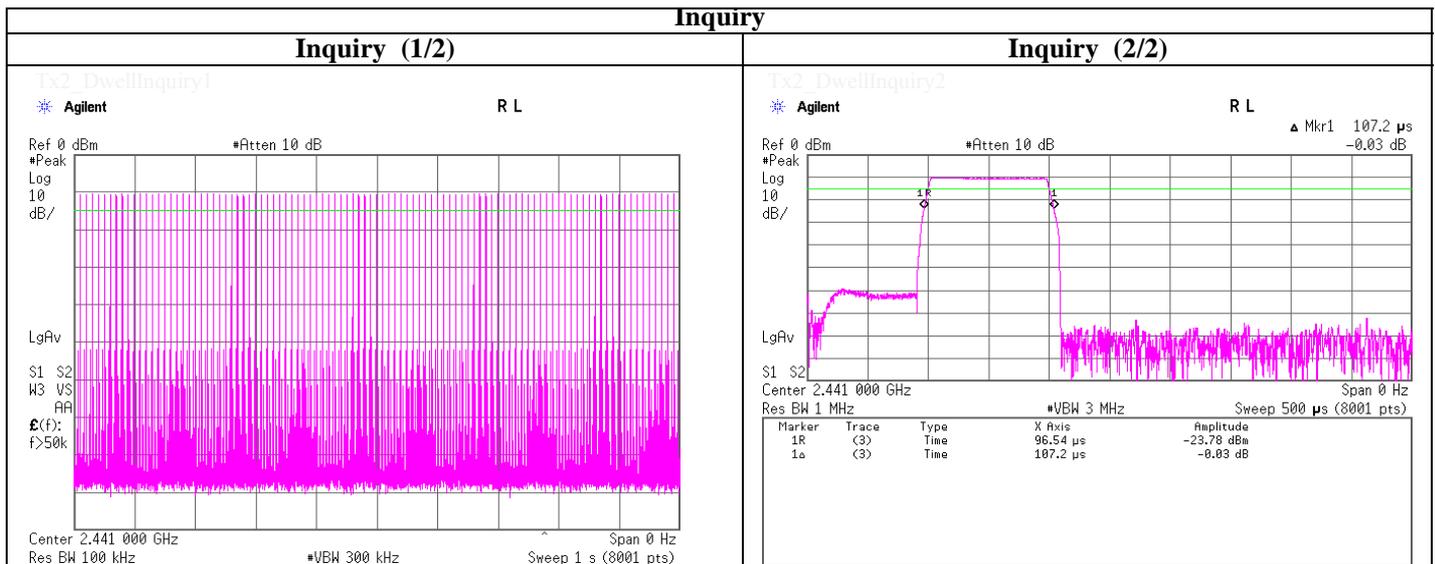
Test place           UL Japan, Inc. Shonan EMC Lab.           No.5 Shielded Room  
 Date                 August 1, 2013  
 Temperature / Humidity 24 deg.C   , 69 %RH  
 Engineer            Shinichi Takano  
 Mode                Tx, Bluetooth, BDR, PRBS9

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	0.404	130	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.661	274	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.909	314	400
Inquiry	100.0 / 1.0 sec. x 12.8 sec. = 1280 times	0.107	137	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  $N=79$ .



**UL Japan, Inc.**

**Shonan EMC Lab.**

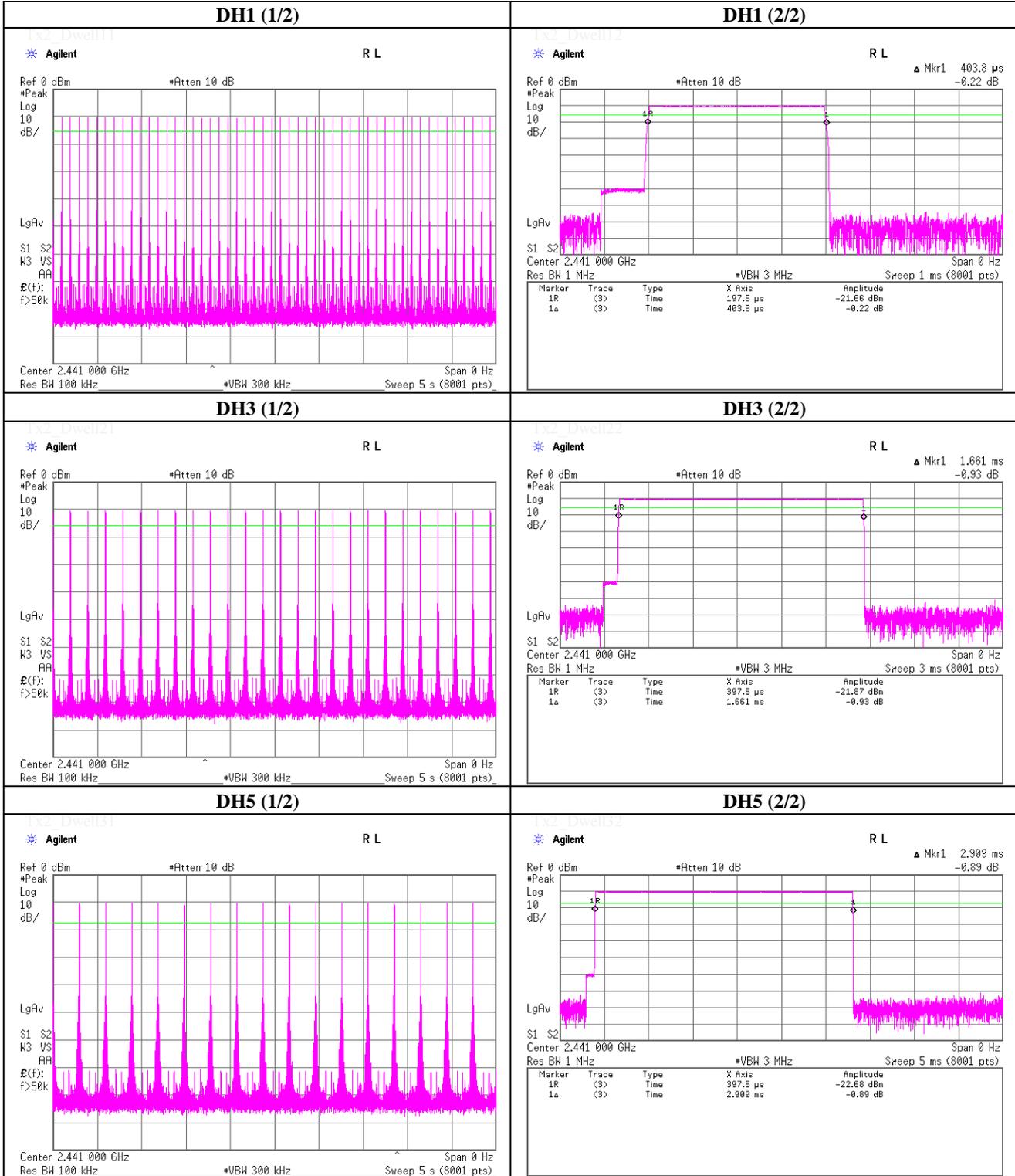
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## Dwell time

### Tx, Bluetooth, BDR, PRBS9



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## Dwell Time

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.5 Shielded Room  
 Date                            August 1, 2013  
 Temperature / Humidity   24 deg.C   , 69 %RH  
 Engineer                     Shinichi Takano  
 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	0.419	135	400
3-DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.670	275	400
3-DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.923	316	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  $N=79$ .

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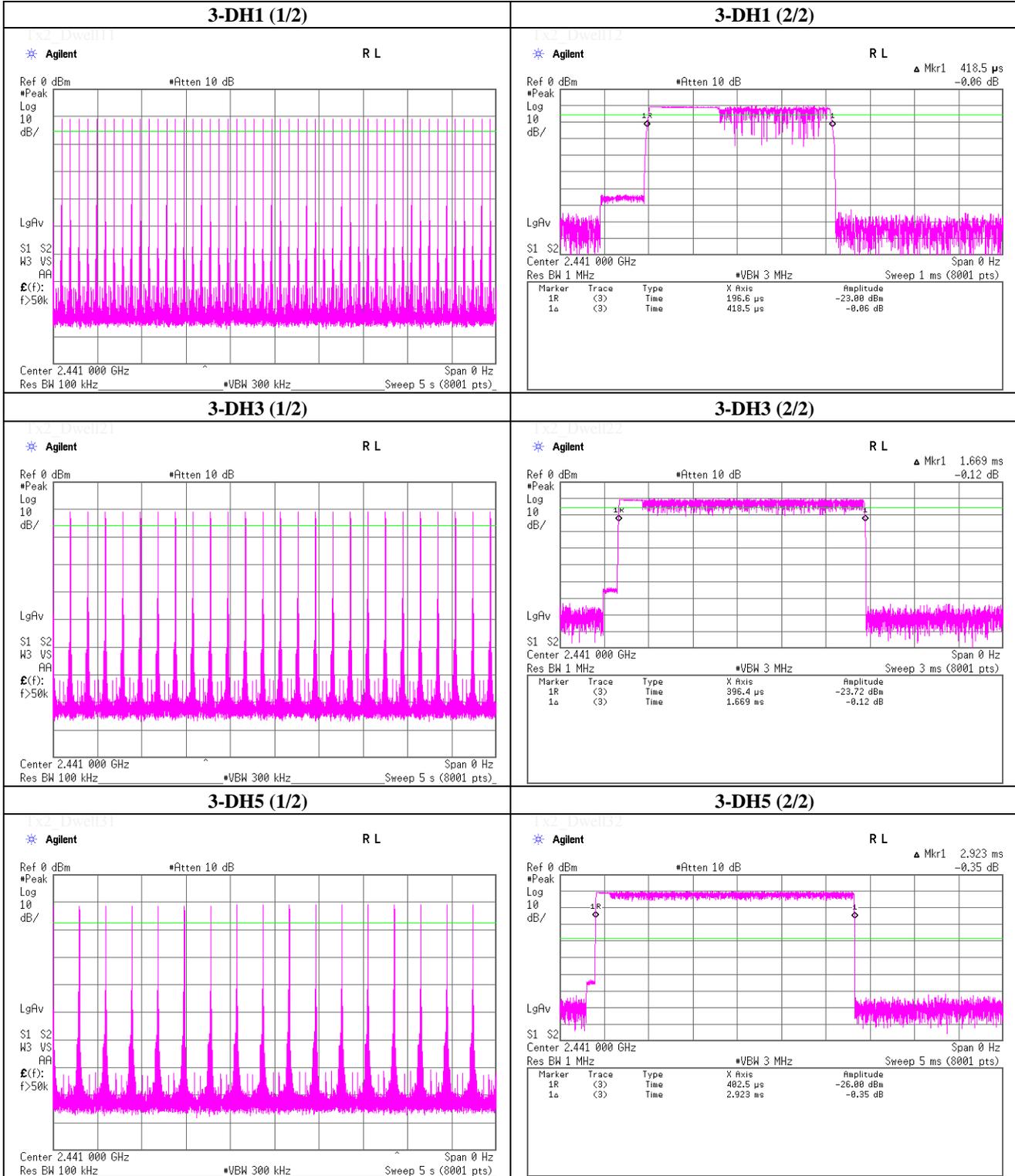
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## Dwell time

**Tx, Bluetooth, EDR, PRBS9**



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## Maximum Peak Conducted Output Power (Conducted)

Test place                   UL Japan, Inc. Shonan EMC Lab.     No.5 Shielded Room  
 Date                         August 1, 2013  
 Temperature / Humidity    24 deg.C     , 69 %RH  
 Engineer                  Shinichi Takano  
 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	-10.28	1.18	9.98	0.88	1.22	20.97	125	20.09
DH5	2441.0	-10.11	1.19	9.98	1.06	1.28	20.97	125	19.91
DH5	2480.0	-10.04	1.21	9.98	1.15	1.30	20.97	125	19.82
2-DH5	2402.0	-9.64	1.18	9.98	1.52	1.42	20.97	125	19.45
2-DH5	2441.0	-9.56	1.19	9.98	1.61	1.45	20.97	125	19.36
2-DH5	2480.0	-9.81	1.21	9.98	1.38	1.37	20.97	125	19.59
3-DH5	2402.0	-9.61	1.18	9.98	1.55	1.43	20.97	125	19.42
3-DH5	2441.0	-9.54	1.19	9.98	1.63	1.46	20.97	125	19.34
3-DH5	2480.0	-9.72	1.21	9.98	1.47	1.40	20.97	125	19.50

Sample Calculation:

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

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## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
 Date                         July 31, 2013   August 2, 2013  
 Temperature / Humidity   27 deg.C , 58 %RH                                 25 deg.C , 54 %RH  
 Engineer                    Wataru Kojima                                       Akio Hayashi  
 Mode                         Tx,   2402 MHz  
                                   Tx, Bluetooth, BDR, PRBS9

(\* 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.	306.026	QP	25.4	14.1	8.6	32.0		16.1	46.0	29.9	105	100	
Hori.	360.014	QP	39.1	15.3	8.9	31.9		31.4	46.0	14.6	100	207	
Hori.	408.017	QP	35.7	16.3	9.1	32.0		29.1	46.0	16.9	100	202	
Hori.	1601.988	PK	49.2	25.1	13.8	40.9		47.2	73.9	26.7	100	176	
Hori.	2390.000	PK	46.8	27.4	14.7	41.1		47.8	73.9	26.1	100	80	
Hori.	4804.000	PK	57.8	31.1	7.5	41.2		55.2	73.9	18.7	116	166	
Hori.	7206.000	PK	46.5	36.6	9.1	41.0		51.2	73.9	22.7	100	0	
Hori.	9608.000	PK	43.0	38.5	10.2	38.9		52.8	73.9	21.1	100	0	
Hori.	12010.000	PK	43.9	39.4	11.5	39.1		55.7	73.9	18.2	100	0	
Hori.	1601.988	AV	41.9	25.1	13.8	40.9		39.9	53.9	14.0	100	176	
Hori.	2390.000	AV	34.2	27.4	14.7	41.1		35.2	53.9	18.7	100	80	
Vert.	30.536	QP	25.0	17.8	6.4	32.2		17.0	40.0	23.0	100	323	
Vert.	1601.988	PK	51.7	25.1	13.8	40.9		49.7	73.9	24.2	104	317	
Vert.	2390.000	PK	46.3	27.4	14.7	41.1		47.3	73.9	26.6	100	1	
Vert.	4804.000	PK	53.4	31.1	7.5	41.2		50.8	73.9	23.1	100	232	
Vert.	7206.000	PK	46.8	36.6	9.1	41.0		51.5	73.9	22.4	100	0	
Vert.	9608.000	PK	42.7	38.5	10.2	38.9		52.5	73.9	21.4	100	0	
Vert.	12010.000	PK	43.3	39.4	11.5	39.1		55.1	73.9	18.8	100	0	
Vert.	1601.988	AV	46.5	25.1	13.8	40.9		44.5	53.9	9.4	104	317	
Vert.	2390.000	AV	34.2	27.4	14.7	41.1		35.2	53.9	18.7	100	1	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	4804.000	AV	52.7	31.1	7.5	41.2	-24.6	25.5	53.9	28.4	116	166	
Hori.	7206.000	AV	34.3	36.6	9.1	41.0	-24.6	14.4	53.9	39.5	100	0	
Hori.	9608.000	AV	31.0	38.5	10.2	38.9	-24.6	16.2	53.9	37.7	100	0	
Hori.	12010.000	AV	31.7	39.4	11.5	39.1	-24.6	18.9	53.9	35.0	100	0	
Vert.	4804.000	AV	50.4	31.1	7.5	41.2	-24.6	23.2	53.9	30.7	100	232	
Vert.	7206.000	AV	34.3	36.6	9.1	41.0	-24.6	14.4	53.9	39.5	100	0	
Vert.	9608.000	AV	31.1	38.5	10.2	38.9	-24.6	16.3	53.9	37.6	100	0	
Vert.	12010.000	AV	31.8	39.4	11.5	39.1	-24.6	19.0	53.9	34.9	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

\*Above 3rd harmonic was not seen so the result was its base noise level.

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

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	89.3	27.4	14.7	41.1	90.3	90.3	-	-	Carrier
Hori.	2400.000	PK	45.0	27.4	14.7	41.1	46.0	46.0	70.3	24.3	
Vert.	2402.000	PK	92.4	27.4	14.7	41.1	93.4	93.4	-	-	Carrier
Vert.	2400.000	PK	46.4	27.4	14.7	41.1	47.4	47.4	73.4	26.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

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## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
 Date                         July 31, 2013   August 2, 2013  
 Temperature / Humidity   27 deg.C , 58 %RH                                 25 deg.C , 54 %RH  
 Engineer                    Wataru Kojima                                       Akio Hayashi  
 Mode                         Tx,   2480 MHz  
                                   Tx, Bluetooth, BDR, PRBS9

(\* 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.	78.198	QP	36.3	6.4	7.3	32.1		17.9	40.0	22.1	237	269	
Hori.	348.014	QP	37.3	15.0	8.8	31.9		29.2	46.0	16.8	100	134	
Hori.	360.016	QP	38.9	15.3	8.9	31.9		31.2	46.0	14.8	100	141	
Hori.	1652.660	PK	48.6	25.4	13.9	41.0		46.9	73.9	27.0	100	227	
Hori.	2483.500	PK	46.1	27.5	14.8	41.0		47.4	73.9	26.5	100	81	
Hori.	4960.000	PK	54.7	31.6	7.5	41.1		52.7	73.9	21.2	100	171	
Hori.	7440.000	PK	47.7	36.7	9.0	41.1		52.3	73.9	21.6	100	0	
Hori.	9920.000	PK	43.7	39.0	10.0	38.8		53.9	73.9	20.0	100	0	
Hori.	12400.000	PK	44.6	39.5	11.3	39.1		56.3	73.9	17.6	100	0	
Hori.	1652.660	AV	40.5	25.4	13.9	41.0		38.8	53.9	15.1	100	227	
Hori.	2483.500	AV	34.2	27.5	14.8	41.0		35.5	53.9	18.4	100	81	
Vert.	30.546	QP	25.6	17.8	6.4	32.2		17.6	40.0	22.4	100	37	
Vert.	1652.660	PK	51.5	25.4	13.9	41.0		49.8	73.9	24.1	100	311	
Vert.	2483.500	PK	47.7	27.5	14.8	41.0		49.0	73.9	24.9	100	0	
Vert.	4960.000	PK	55.4	31.6	7.5	41.1		53.4	73.9	20.5	100	166	
Vert.	7440.000	PK	47.8	36.7	9.0	41.1		52.4	73.9	21.5	100	0	
Vert.	9920.000	PK	43.4	39.0	10.0	38.8		53.6	73.9	20.3	100	0	
Vert.	12400.000	PK	44.3	39.5	11.3	39.1		56.0	73.9	17.9	100	0	
Vert.	1652.660	AV	45.5	25.4	13.9	41.0		43.8	53.9	10.1	100	311	
Vert.	2483.500	AV	35.9	27.5	14.8	41.0		37.2	53.9	16.7	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	4960.000	AV	48.5	31.6	7.5	41.1	-24.6	21.9	53.9	32.0	100	171	
Hori.	7440.000	AV	34.8	36.7	9.0	41.1	-24.6	14.8	53.9	39.1	100	0	
Hori.	9920.000	AV	30.5	39.0	10.0	38.8	-24.6	16.1	53.9	37.8	100	0	
Hori.	12400.000	AV	31.9	39.5	11.3	39.1	-24.6	19.0	53.9	34.9	100	0	
Vert.	4960.000	AV	49.2	31.6	7.5	41.1	-24.6	22.6	53.9	31.3	100	166	
Vert.	7440.000	AV	34.9	36.7	9.0	41.1	-24.6	14.9	53.9	39.0	100	0	
Vert.	9920.000	AV	30.6	39.0	10.0	38.8	-24.6	16.2	53.9	37.7	100	0	
Vert.	12400.000	AV	31.9	39.5	11.3	39.1	-24.6	19.0	53.9	34.9	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

\*Above 3rd harmonic was not seen so the result was its base noise level.

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## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
 Date                         July 31, 2013   August 2, 2013  
 Temperature / Humidity   27 deg.C , 58 %RH                                 25 deg.C , 54 %RH  
 Engineer                    Wataru Kojima                                       Akio Hayashi  
 Mode                         Tx,                         2402 MHz  
                                   Tx, Bluetooth, EDR, PRBS9

(\* 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.	348.016	QP	37.1	15.0	8.8	31.9		29.0	46.0	17.0	100	130	
Hori.	360.014	QP	38.8	15.3	8.9	31.9		31.1	46.0	14.9	100	213	
Hori.	408.018	QP	35.7	16.3	9.1	32.0		29.1	46.0	16.9	100	200	
Hori.	1601.994	PK	49.5	25.1	13.8	40.9		47.5	73.9	26.4	100	174	
Hori.	2390.000	PK	56.9	27.4	14.7	41.1		57.9	73.9	16.0	100	82	
Hori.	4804.000	PK	52.9	31.1	7.5	41.2		50.3	73.9	23.6	118	167	
Hori.	7206.000	PK	47.8	36.6	9.1	41.0		52.5	73.9	21.4	100	0	
Hori.	9608.000	PK	45.0	38.5	10.2	38.9		54.8	73.9	19.1	100	0	
Hori.	12010.000	PK	43.8	39.4	11.5	39.1		55.6	73.9	18.3	100	0	
Hori.	1601.994	AV	42.3	25.1	13.8	40.9		40.3	53.9	13.6	100	174	
Hori.	2390.000	AV	34.2	27.4	14.7	41.1		35.2	53.9	18.7	100	82	
Vert.	30.511	QP	25.6	17.8	6.4	32.2		17.6	40.0	22.4	100	2	
Vert.	1601.994	PK	52.1	25.1	13.8	40.9		50.1	73.9	23.8	100	315	
Vert.	2390.000	PK	46.5	27.4	14.7	41.1		47.5	73.9	26.4	100	0	
Vert.	4804.000	PK	52.0	31.1	7.5	41.2		49.4	73.9	24.5	100	38	
Vert.	7206.000	PK	47.2	36.6	9.1	41.0		51.9	73.9	22.0	100	0	
Vert.	9608.000	PK	43.8	38.5	10.2	38.9		53.6	73.9	20.3	100	0	
Vert.	12010.000	PK	44.8	39.4	11.5	39.1		56.6	73.9	17.3	100	0	
Vert.	1601.994	AV	46.9	25.1	13.8	40.9		44.9	53.9	9.0	100	315	
Vert.	2390.000	AV	34.3	27.4	14.7	41.1		35.3	53.9	18.6	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	4804.000	AV	42.2	31.1	7.5	41.2	-24.6	15.0	53.9	38.9	118	167	
Hori.	7206.000	AV	34.4	36.6	9.1	41.0	-24.6	14.5	53.9	39.4	100	0	
Hori.	9608.000	AV	31.1	38.5	10.2	38.9	-24.6	16.3	53.9	37.6	100	0	
Hori.	12010.000	AV	31.8	39.4	11.5	39.1	-24.6	19.0	53.9	34.9	100	0	
Vert.	4804.000	AV	40.9	31.1	7.5	41.2	-24.6	13.7	53.9	40.2	100	38	
Vert.	7206.000	AV	34.4	36.6	9.1	41.0	-24.6	14.5	53.9	39.4	100	0	
Vert.	9608.000	AV	31.3	38.5	10.2	38.9	-24.6	16.5	53.9	37.4	100	0	
Vert.	12010.000	AV	31.9	39.4	11.5	39.1	-24.6	19.1	53.9	34.8	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

\*Above 3rd harmonic was not seen so the result was its base noise level.

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

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	89.4	27.4	14.7	41.1	90.4	90.4	-	-	Carrier
Hori.	2400.000	PK	43.4	27.4	14.7	41.1	44.4	44.4	70.4	26.0	
Vert.	2402.000	PK	92.6	27.4	14.7	41.1	93.6	93.6	-	-	Carrier
Vert.	2400.000	PK	46.4	27.4	14.7	41.1	47.4	47.4	73.6	26.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier)

**UL Japan, Inc.**

**Shonan EMC Lab.**

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## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.3 Semi Anechoic Chamber  
 Date                              July 31, 2013    August 2, 2013  
 Temperature / Humidity      27 deg.C , 58 %RH                                  25 deg.C , 54 %RH  
 Engineer                        Wataru Kojima    Akio Hayashi  
 Mode                              Tx,    2441 MHz  
    Tx, Bluetooth, EDR, PRBS9

(\* 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.	348.010	QP	37.3	15.0	8.8	31.9		29.2	46.0	16.8	100	133	
Hori.	360.017	QP	38.9	15.3	8.9	31.9		31.2	46.0	14.8	100	210	
Hori.	408.017	QP	35.7	16.3	9.1	32.0		29.1	46.0	16.9	100	205	
Hori.	1626.680	PK	48.8	25.2	13.8	41.0		46.8	73.9	27.1	100	176	
Hori.	4882.000	PK	51.4	31.3	7.5	41.1		49.1	73.9	24.8	103	166	
Hori.	7323.000	PK	46.6	36.6	9.0	41.1		51.1	73.9	22.8	100	0	
Hori.	9764.000	PK	42.9	38.7	10.1	38.8		52.9	73.9	21.0	100	0	
Hori.	12205.000	PK	44.4	39.5	11.4	39.1		56.2	73.9	17.7	100	0	
Hori.	1626.680	AV	41.1	25.2	13.8	41.0		39.1	53.9	14.8	100	176	
Vert.	30.529	QP	25.3	17.8	6.4	32.2		17.3	40.0	22.7	100	5	
Vert.	1626.680	PK	51.4	25.2	13.8	41.0		49.4	73.9	24.5	159	324	
Vert.	4882.000	PK	52.9	31.3	7.5	41.1		50.6	73.9	23.3	187	320	
Vert.	7323.000	PK	47.7	36.6	9.0	41.1		52.2	73.9	21.7	100	0	
Vert.	9764.000	PK	44.5	38.7	10.1	38.8		54.5	73.9	19.4	100	0	
Vert.	12205.000	PK	45.3	39.5	11.4	39.1		57.1	73.9	16.8	100	0	
Vert.	1626.680	AV	46.1	25.2	13.8	41.0		44.1	53.9	9.8	159	324	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	4882.000	AV	41.0	31.3	7.5	41.1	-24.6	14.1	53.9	39.8	103	166	
Hori.	7323.000	AV	34.4	36.6	9.0	41.1	-24.6	14.3	53.9	39.6	100	0	
Hori.	9764.000	AV	31.0	38.7	10.1	38.8	-24.6	16.4	53.9	37.5	100	0	
Hori.	12205.000	AV	34.4	39.5	11.4	39.1	-24.6	21.6	53.9	32.3	100	0	
Vert.	4882.000	AV	41.5	31.3	7.5	41.1	-24.6	14.6	53.9	39.3	187	320	
Vert.	7323.000	AV	34.4	36.6	9.0	41.1	-24.6	14.3	53.9	39.6	100	0	
Vert.	9764.000	AV	30.9	38.7	10.1	38.8	-24.6	16.3	53.9	37.6	100	0	
Vert.	12205.000	AV	32.0	39.5	11.4	39.1	-24.6	19.2	53.9	34.7	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

\*Above 3rd harmonic was not seen so the result was its base noise level.

## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.3 Semi Anechoic Chamber  
 Date                              July 31, 2013    August 2, 2013  
 Temperature / Humidity      27 deg.C , 58 %RH                              25 deg.C , 54 %RH  
 Engineer                        Wataru Kojima                                      Akio Hayashi  
 Mode                              Tx,                              2480 MHz  
    Tx, Bluetooth, EDR, PRBS9

(\* 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.	348.010	QP	37.3	15.0	8.8	31.9		29.2	46.0	16.8	100	130	
Hori.	360.013	QP	38.9	15.3	8.9	31.9		31.2	46.0	14.8	100	210	
Hori.	408.020	QP	35.7	16.3	9.1	32.0		29.1	46.0	16.9	100	208	
Hori.	1652.660	PK	48.5	25.4	13.9	41.0		46.8	73.9	27.1	100	228	
Hori.	2483.500	PK	47.4	27.5	14.8	41.0		48.7	73.9	25.2	100	85	
Hori.	4960.000	PK	49.5	31.6	7.5	41.1		47.5	73.9	26.4	100	163	
Hori.	7440.000	PK	46.4	36.7	9.0	41.1		51.0	73.9	22.9	100	0	
Hori.	9920.000	PK	42.6	39.0	10.0	38.8		52.8	73.9	21.1	100	0	
Hori.	12400.000	PK	43.3	39.5	11.3	39.1		55.0	73.9	18.9	100	0	
Hori.	1652.660	AV	40.4	25.4	13.9	41.0		38.7	53.9	15.2	100	228	
Hori.	2483.500	AV	34.9	27.5	14.8	41.0		36.2	53.9	17.7	100	85	
Vert.	30.001	QP	25.7	17.9	6.4	32.2		17.8	40.0	22.2	100	305	
Vert.	1652.660	PK	50.9	25.4	13.9	41.0		49.2	73.9	24.7	100	312	
Vert.	2483.500	PK	48.5	27.5	14.8	41.0		49.8	73.9	24.1	100	0	
Vert.	4960.000	PK	51.7	31.6	7.5	41.1		49.7	73.9	24.2	226	324	
Vert.	7440.000	PK	47.1	36.7	9.0	41.1		51.7	73.9	22.2	100	0	
Vert.	9920.000	PK	42.8	39.0	10.0	38.8		53.0	73.9	20.9	100	0	
Vert.	12400.000	PK	44.6	39.5	11.3	39.1		56.3	73.9	17.6	100	0	
Vert.	1652.660	AV	45.6	25.4	13.9	41.0		43.9	53.9	10.0	100	312	
Vert.	2483.500	AV	35.5	27.5	14.8	41.0		36.8	53.9	17.1	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	4960.000	AV	37.6	31.6	7.5	41.1	-24.6	11.0	53.9	42.9	100	163	
Hori.	7440.000	AV	34.8	36.7	9.0	41.1	-24.6	14.8	53.9	39.1	100	0	
Hori.	9920.000	AV	30.6	39.0	10.0	38.8	-24.6	16.2	53.9	37.7	100	0	
Hori.	12400.000	AV	31.8	39.5	11.3	39.1	-24.6	18.9	53.9	35.0	100	0	
Vert.	4960.000	AV	40.7	31.6	7.5	41.1	-24.6	14.1	53.9	39.8	226	324	
Vert.	7440.000	AV	34.8	36.7	9.0	41.1	-24.6	14.8	53.9	39.1	100	0	
Vert.	9920.000	AV	30.6	39.0	10.0	38.8	-24.6	16.2	53.9	37.7	100	0	
Vert.	12400.000	AV	31.8	39.5	11.3	39.1	-24.6	18.9	53.9	35.0	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell time factor (refer to "Dwell time factor Calculation")

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

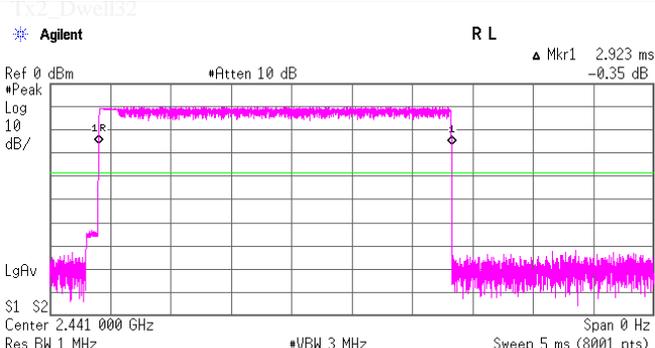
\*Above 3rd harmonic was not seen so the result was its base noise level.



## Dwell time factor Calculation chart

### Dwell time factor Calculation

**Tx, Bluetooth, EDR, PRBS9**

Worst 100ms Dwell time factor = $20\log((2.936 \times 2)/100) = -24.62\text{dB}$	1cycle On time : 2.936ms															
<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><small>1x2_Dwell32</small></p>  <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <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>482.5 <math>\mu</math>s</td> <td>-26.08 dBm</td> </tr> <tr> <td>1a</td> <td>(3)</td> <td>Time</td> <td>2.923 ms</td> <td>-0.35 dB</td> </tr> </tbody> </table>	Marker	Trace	Type	X Axis	Amplitude	1R	(3)	Time	482.5 $\mu$ s	-26.08 dBm	1a	(3)	Time	2.923 ms	-0.35 dB
Marker	Trace	Type	X Axis	Amplitude												
1R	(3)	Time	482.5 $\mu$ s	-26.08 dBm												
1a	(3)	Time	2.923 ms	-0.35 dB												

### VBW (Average) setting

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

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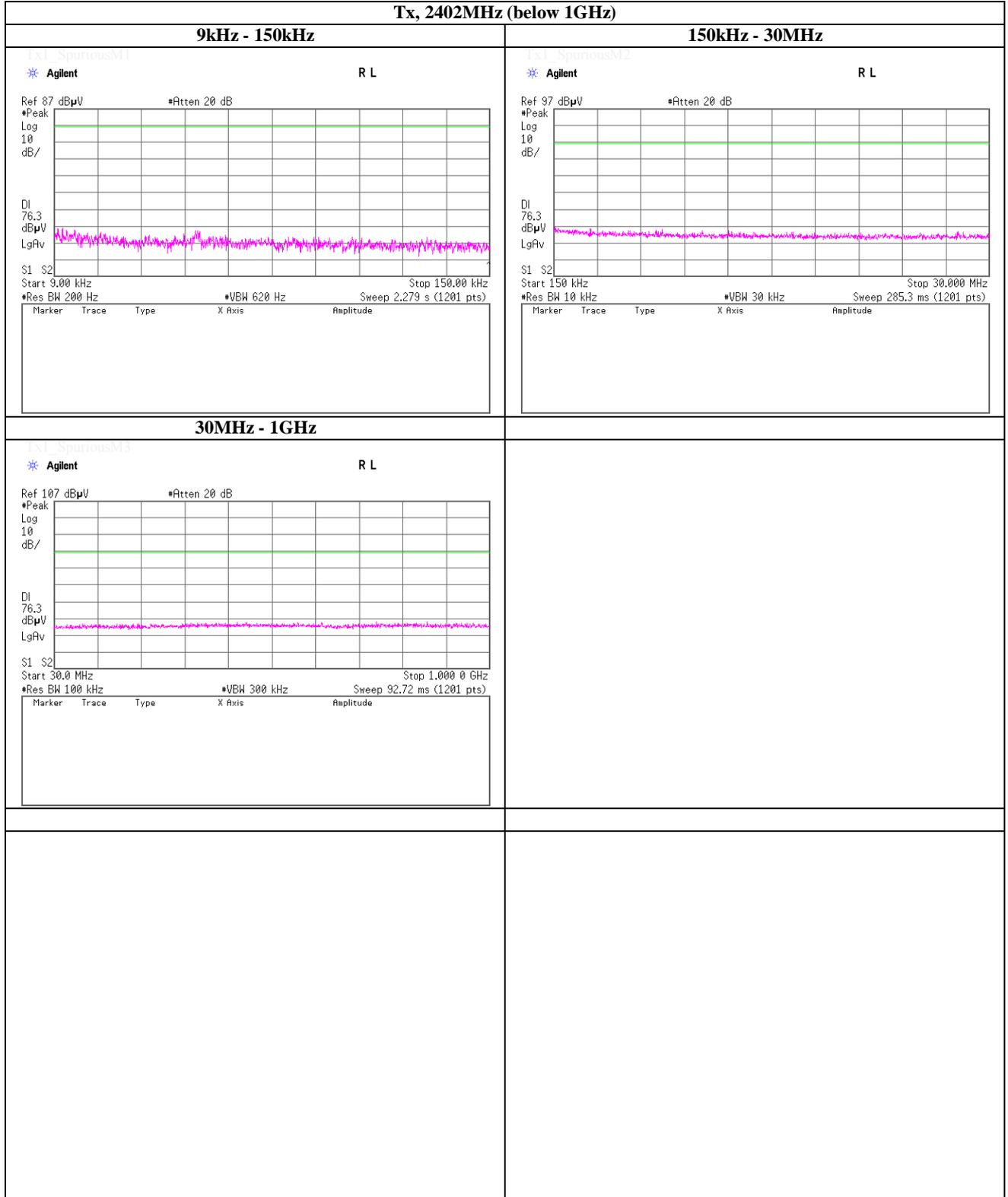
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### Spurious emission (Conducted)

**Tx, Bluetooth, BDR, PRBS9**

**Tx, 2402MHz (below 1GHz)**



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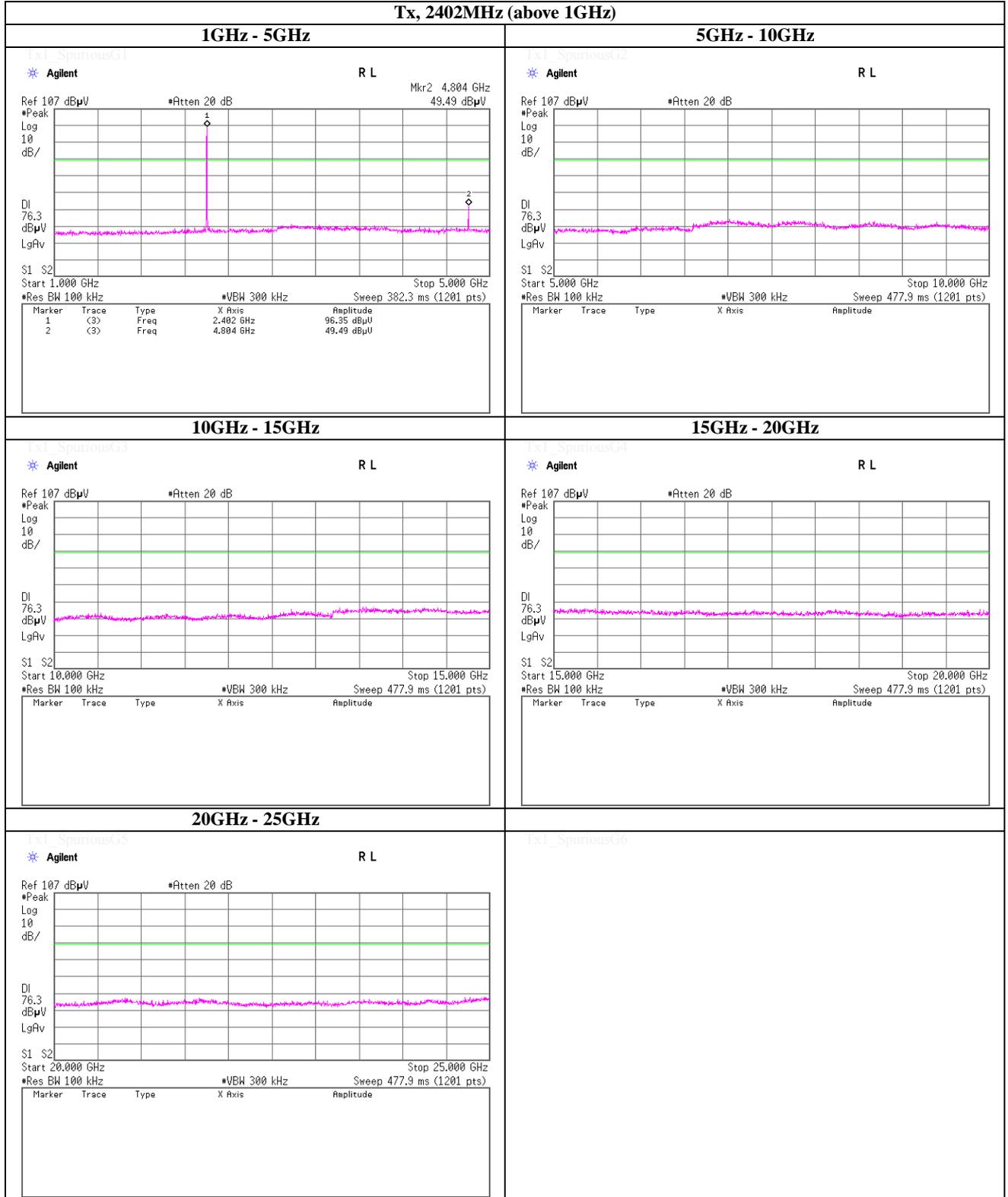
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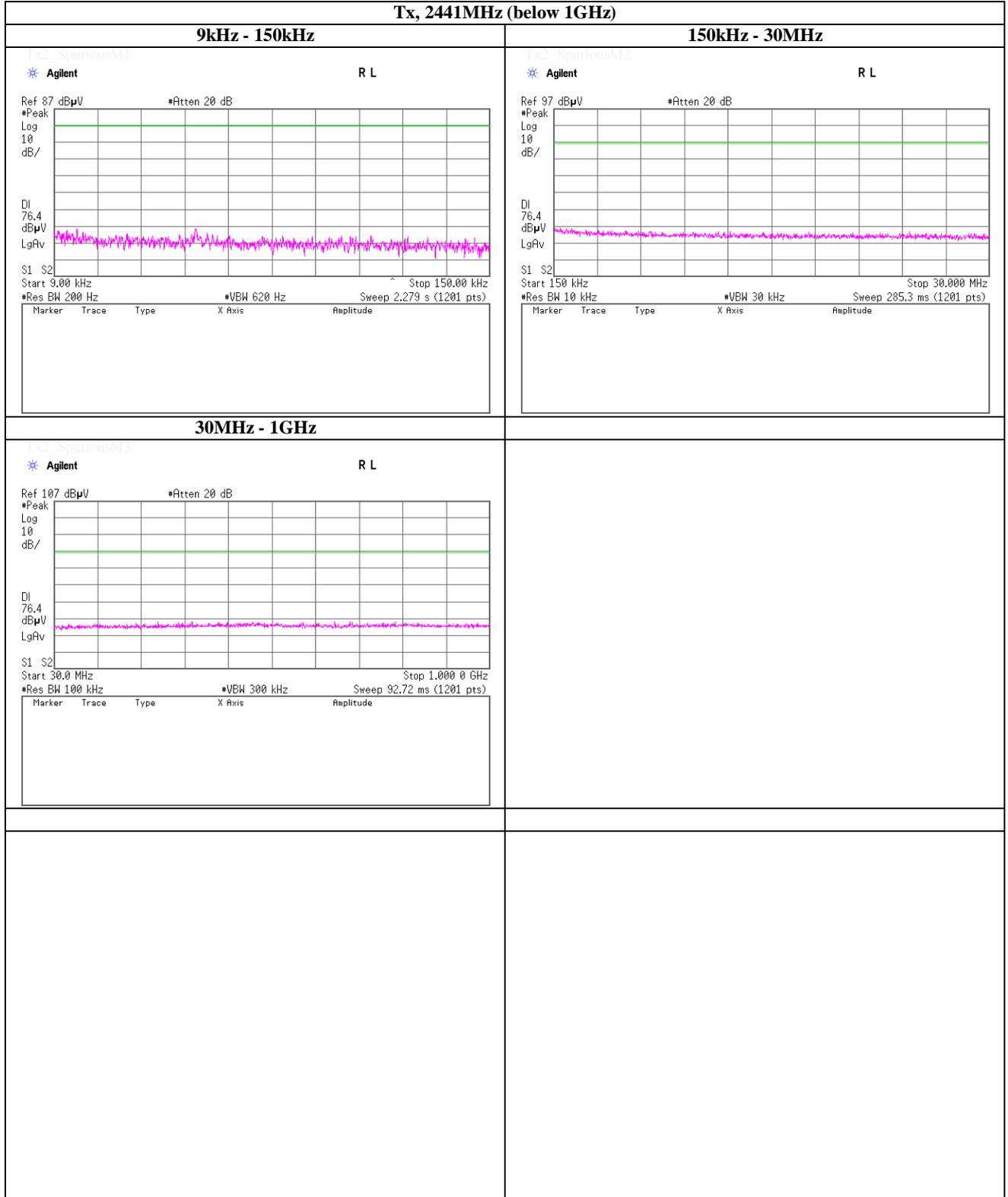
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### Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (below 1GHz)



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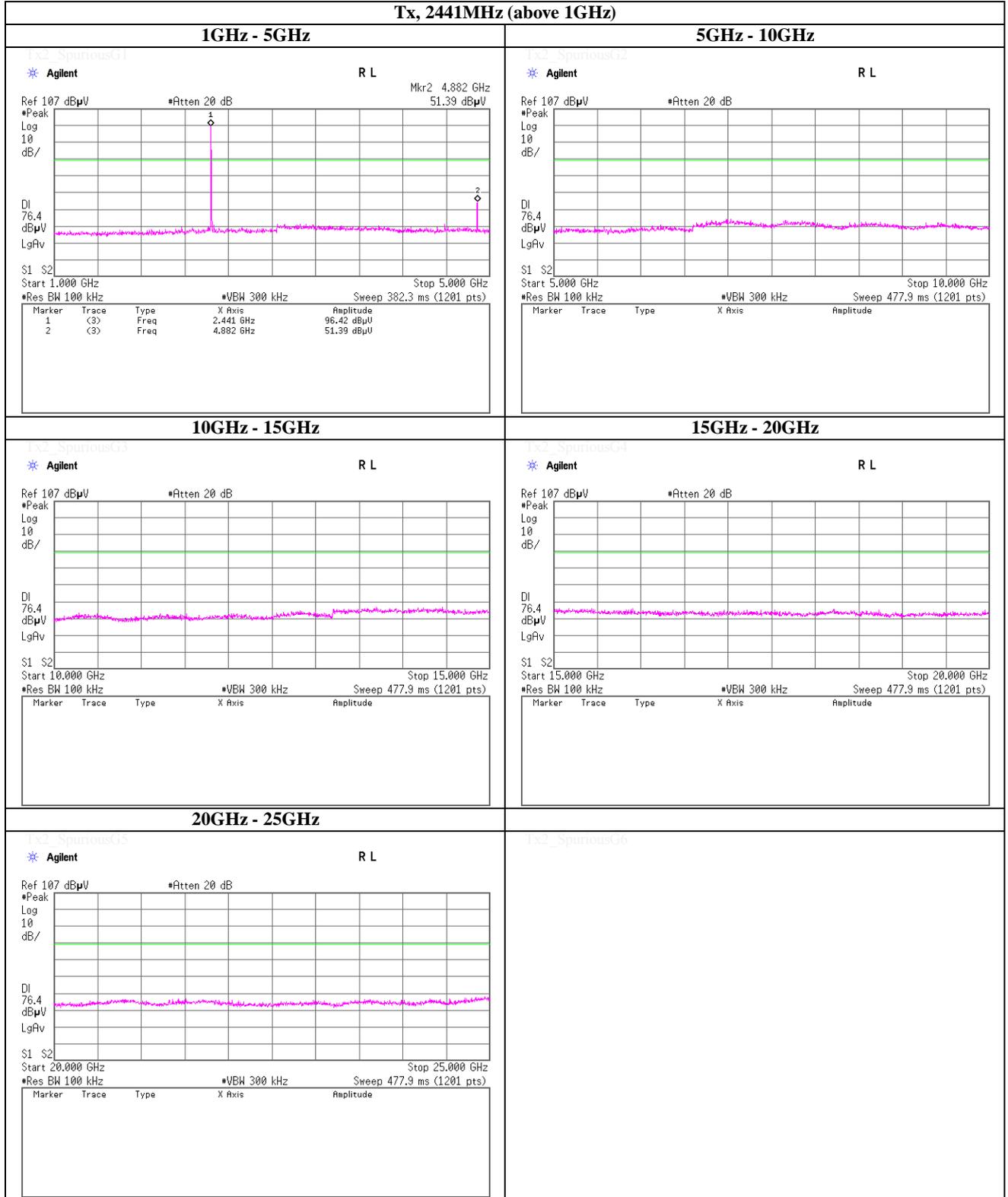
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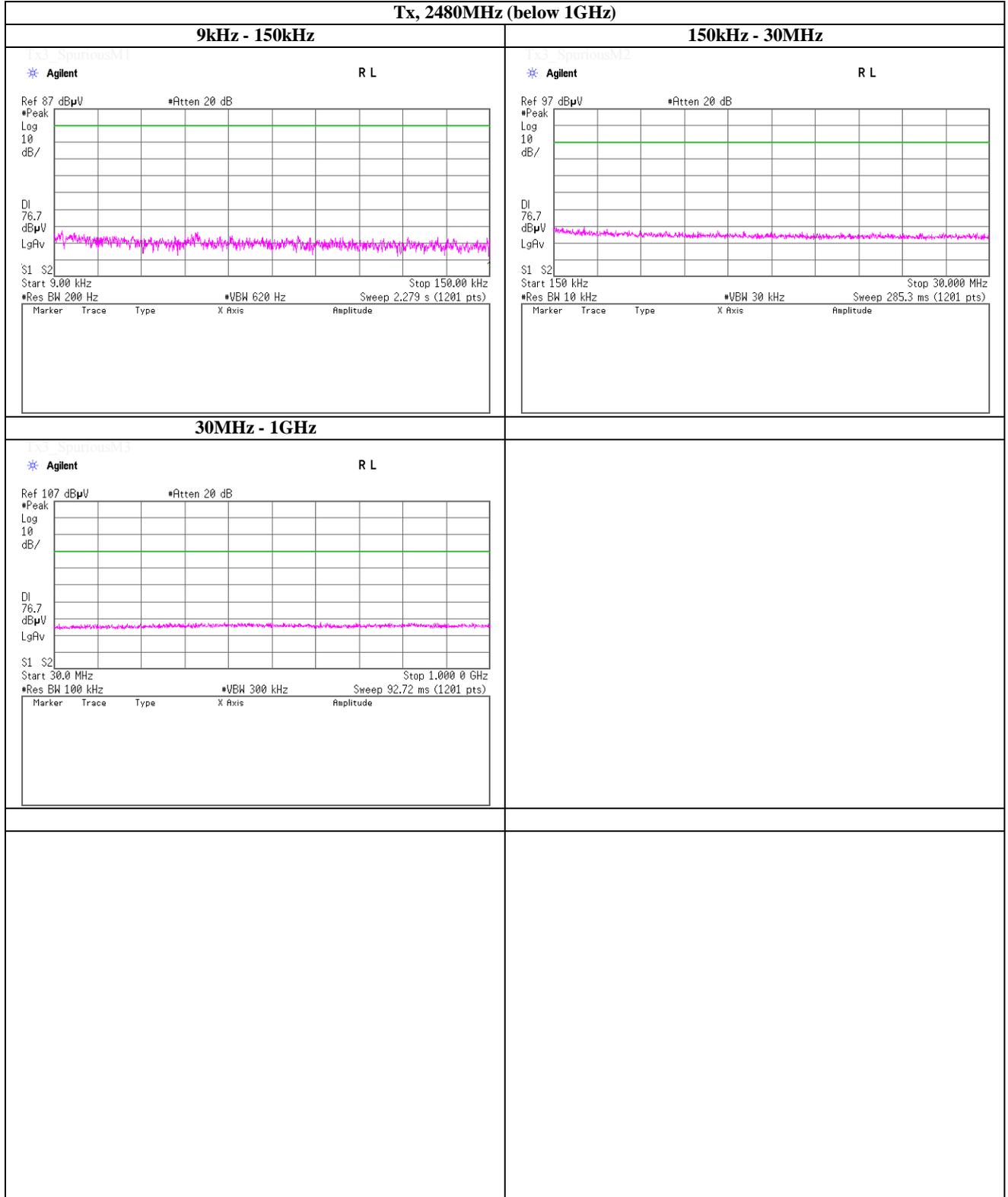
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### Spurious emission (Conducted)

**Tx, Bluetooth, BDR, PRBS9**

**Tx, 2480MHz (below 1GHz)**



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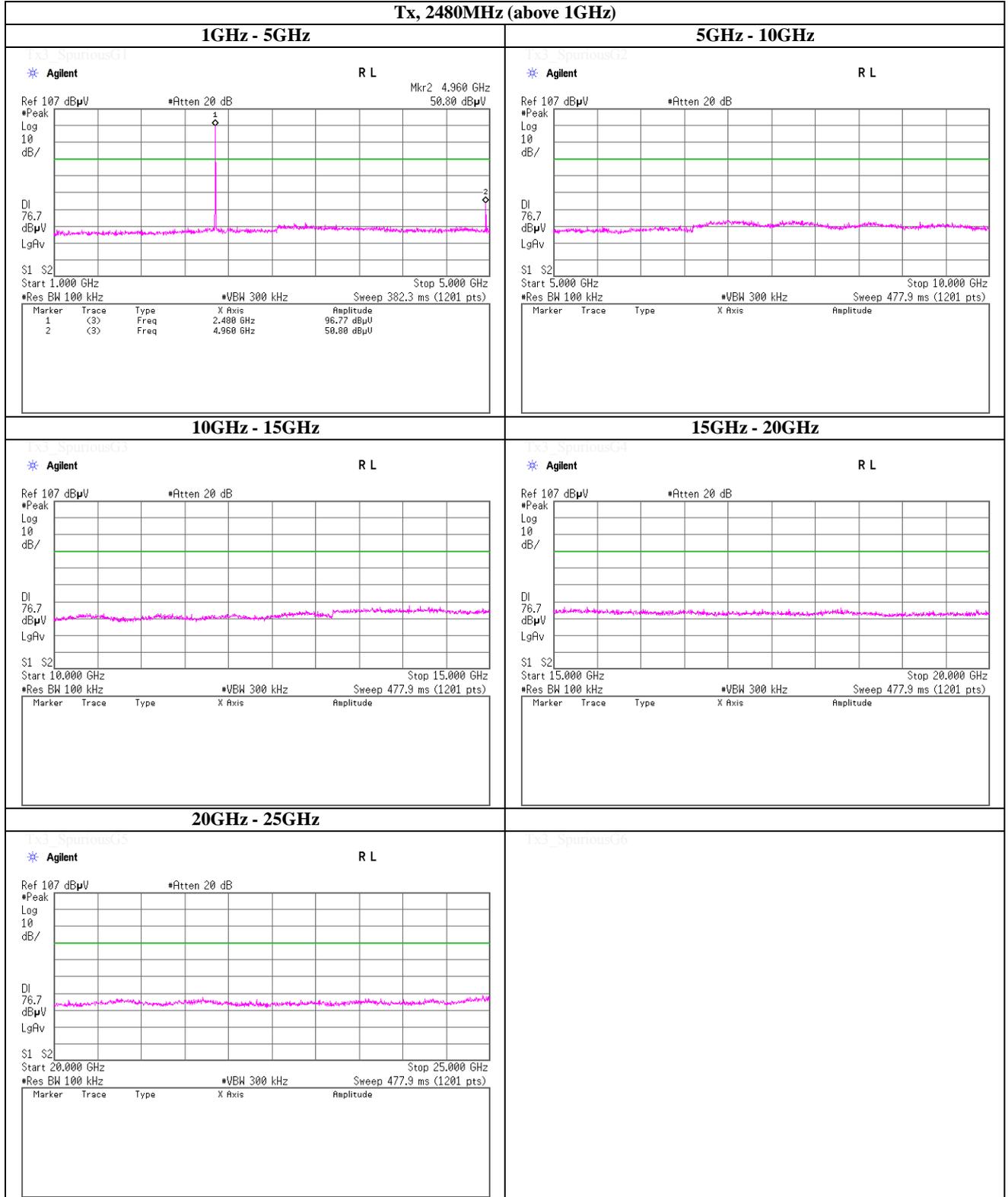
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**Tx, Bluetooth, BDR, PRBS9**

**Tx, 2480MHz (above 1GHz)**



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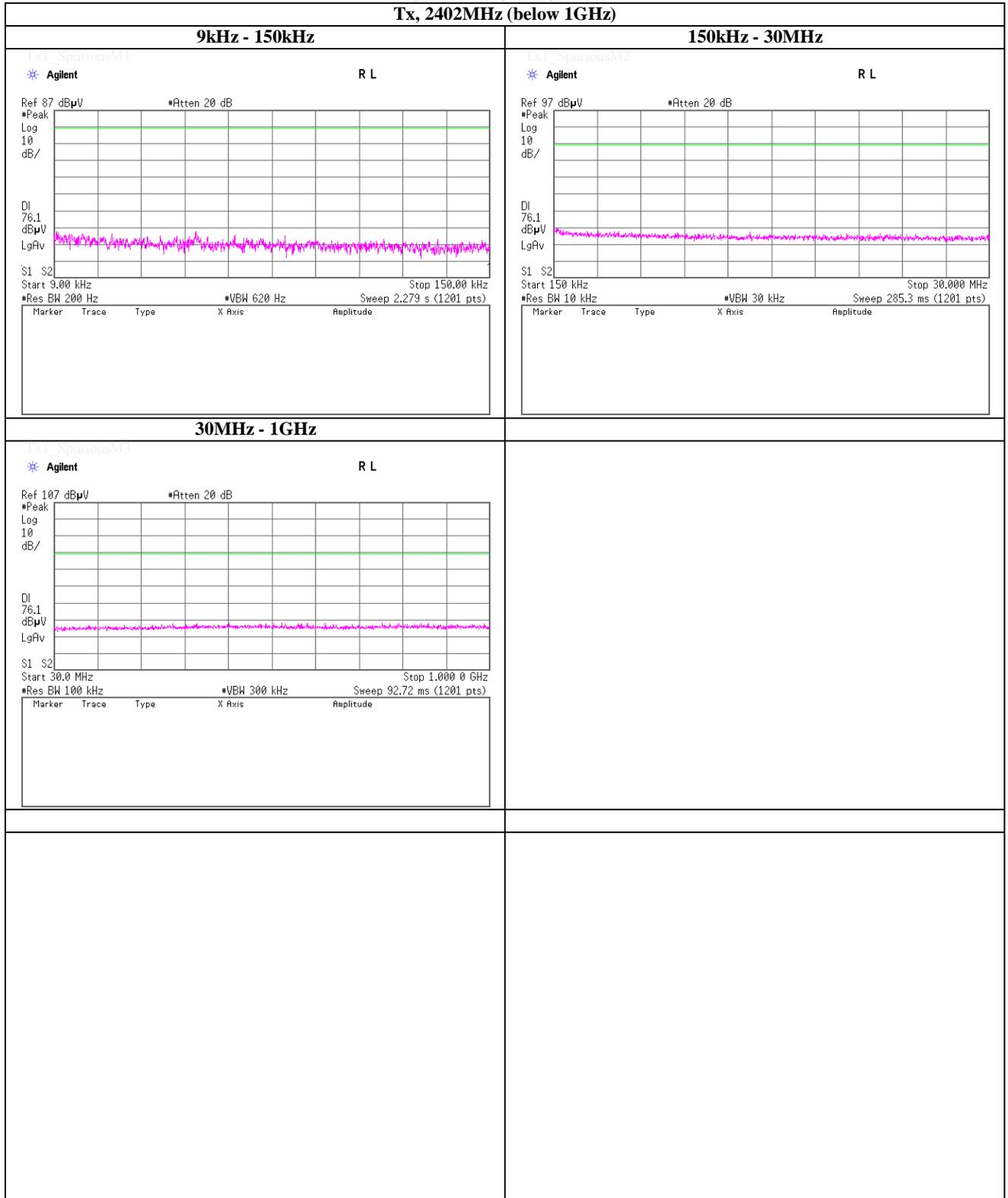
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### Spurious emission (Conducted)

**Tx, Bluetooth, EDR, PRBS9**

**Tx, 2402MHz (below 1GHz)**



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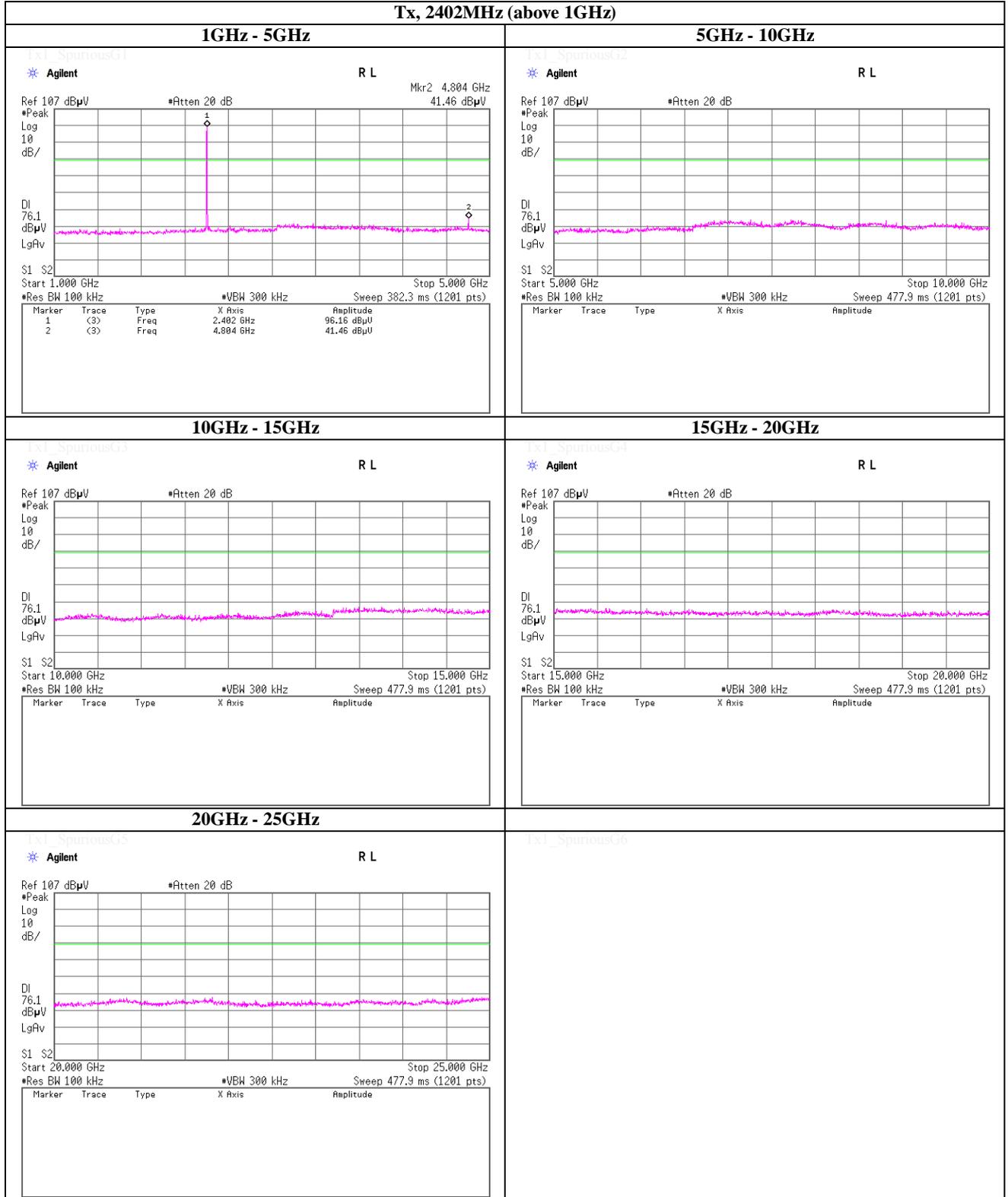
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### Spurious emission (Conducted)

**Tx, Bluetooth, EDR, PRBS9**

**Tx, 2402MHz (above 1GHz)**



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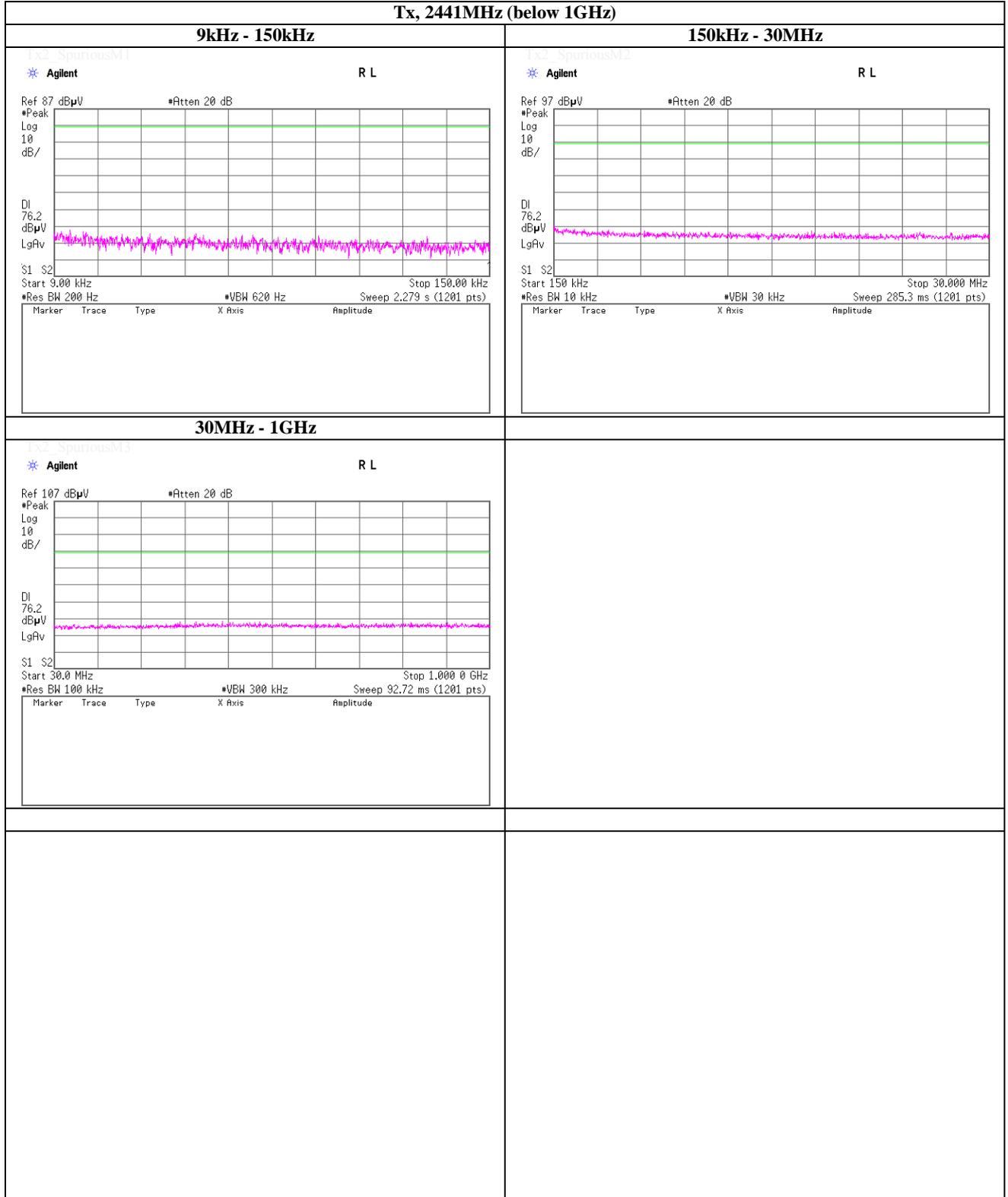
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### Spurious emission (Conducted)

**Tx, Bluetooth, EDR, PRBS9**

**Tx, 2441MHz (below 1GHz)**



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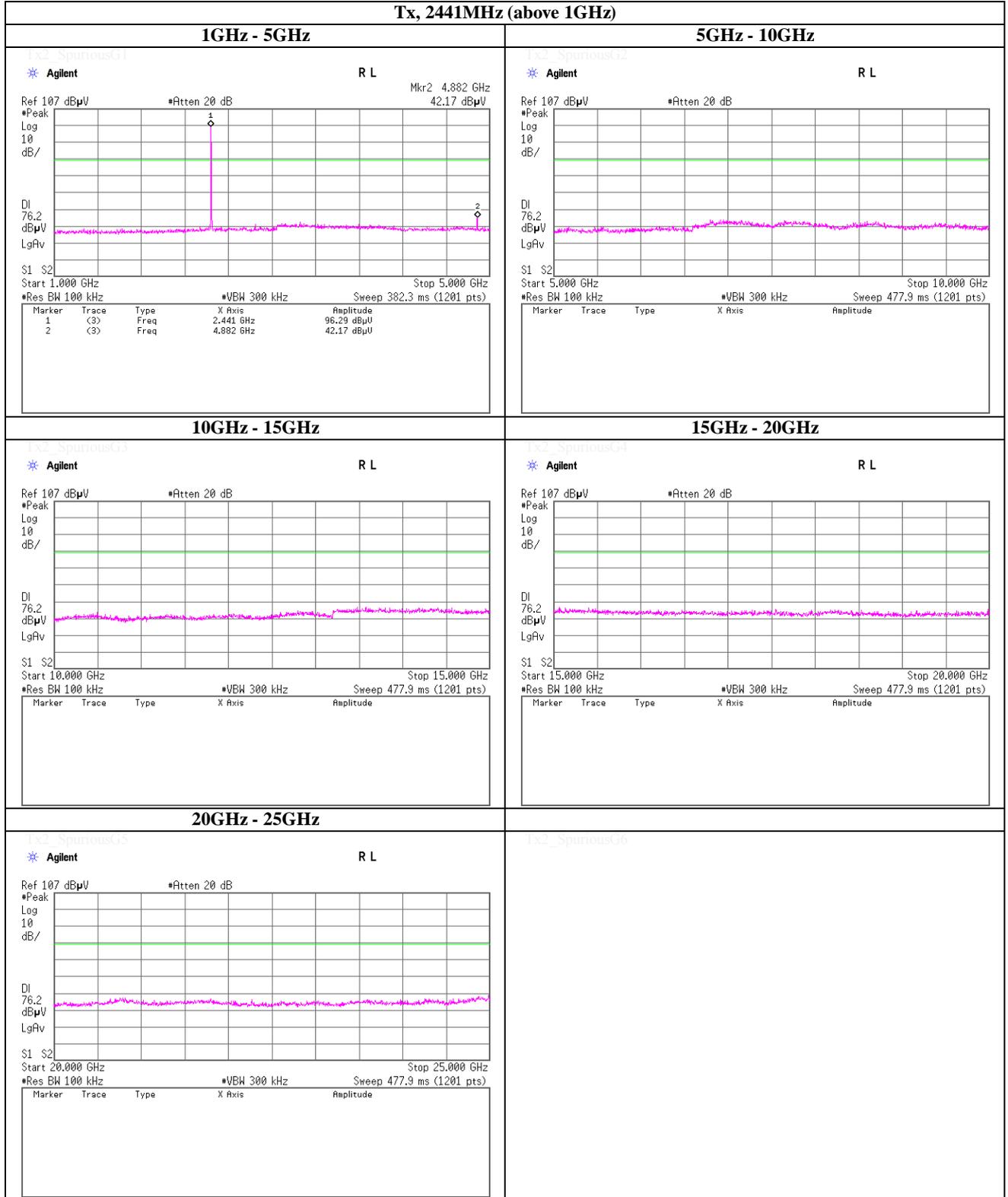
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### Spurious emission (Conducted)

**Tx, Bluetooth, EDR, PRBS9**

**Tx, 2441MHz (above 1GHz)**



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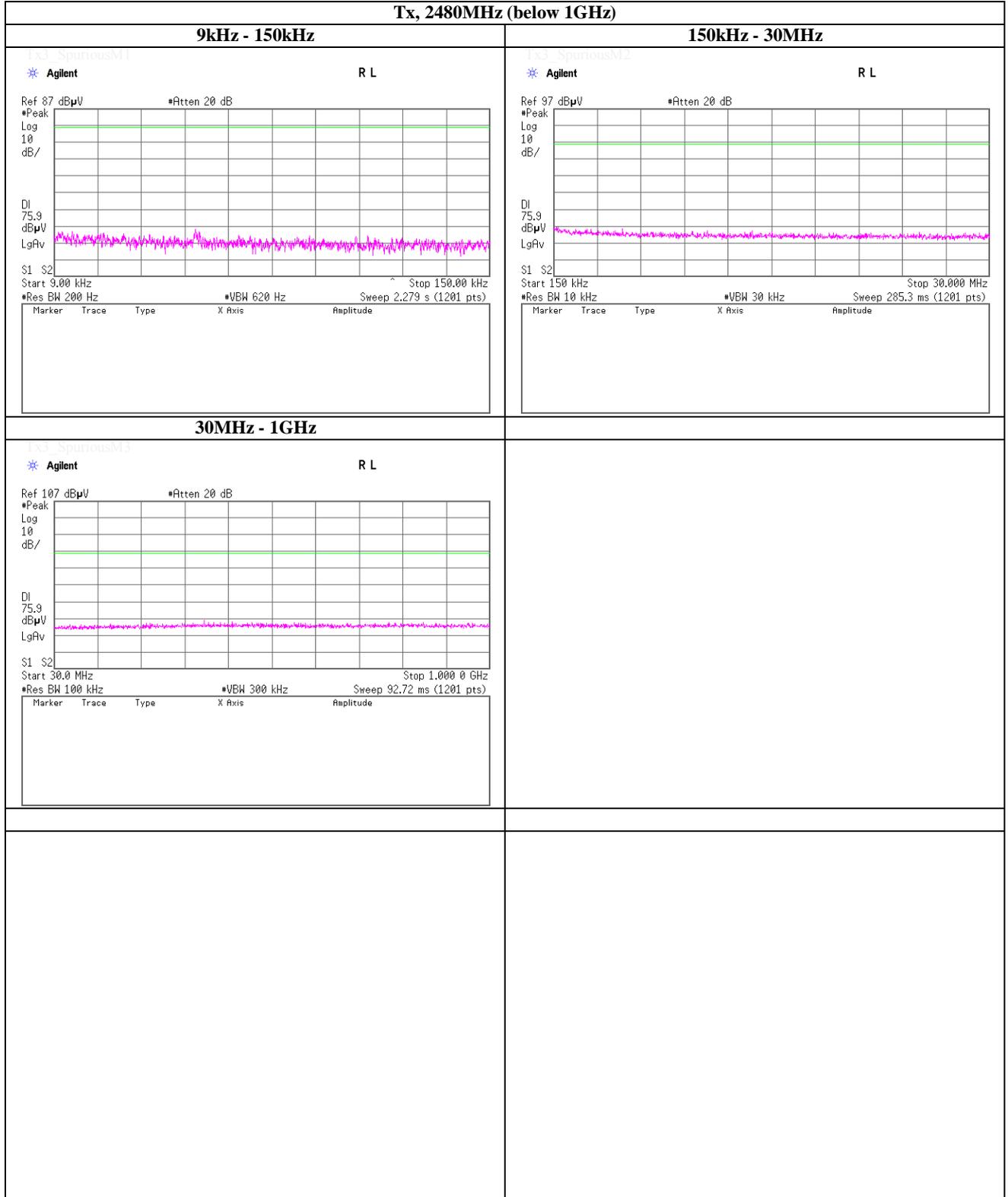
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### Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 1GHz)



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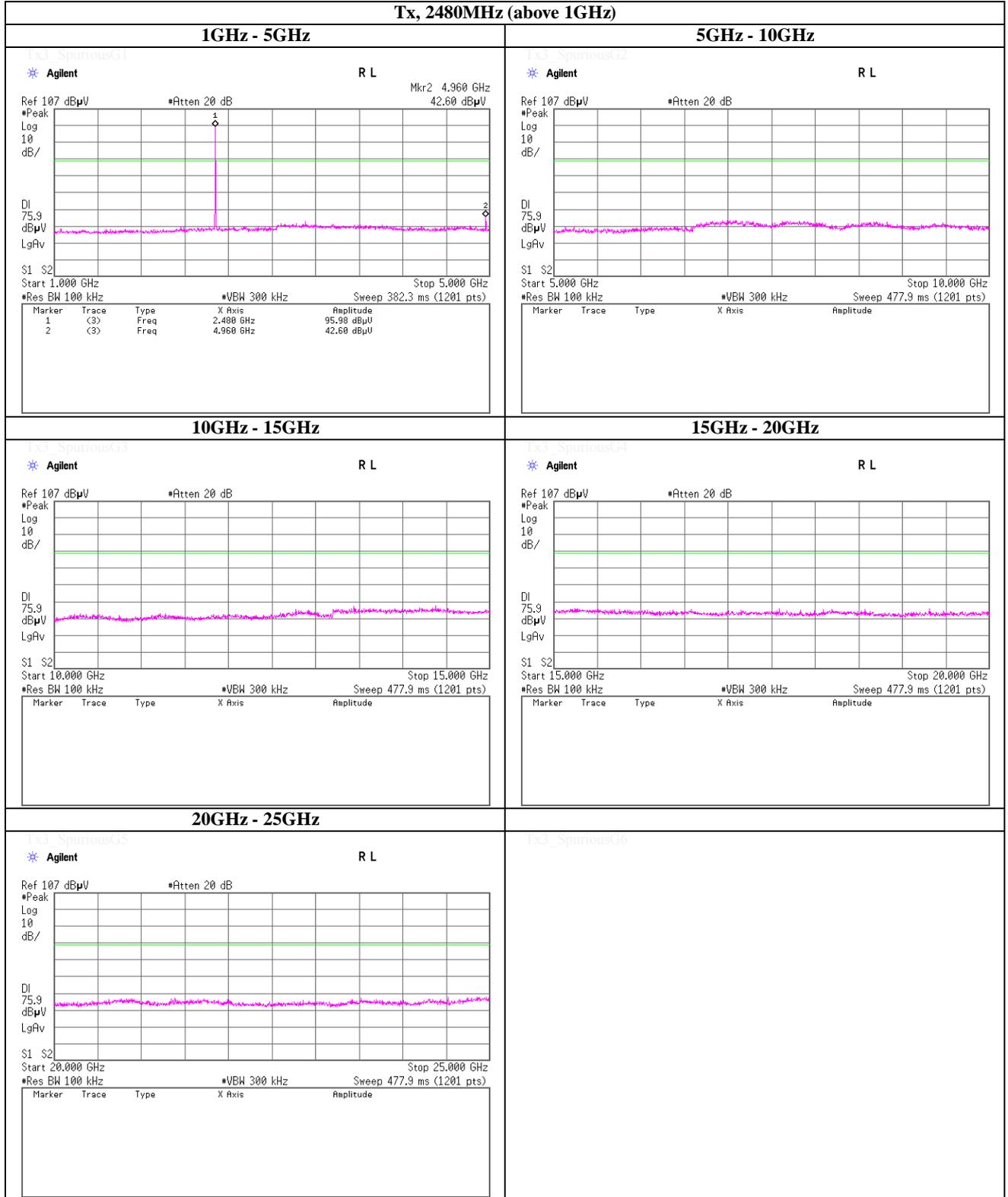
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### Spurious emission (Conducted)

**Tx, Bluetooth, EDR, PRBS9**

**Tx, 2480MHz (above 1GHz)**



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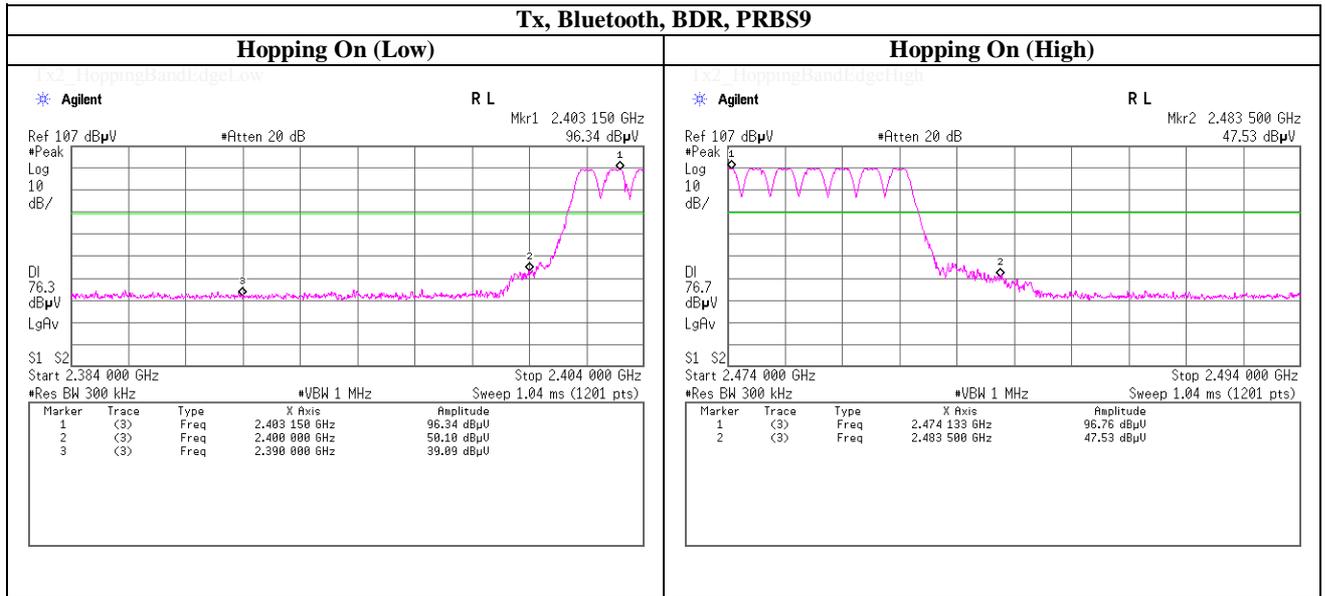
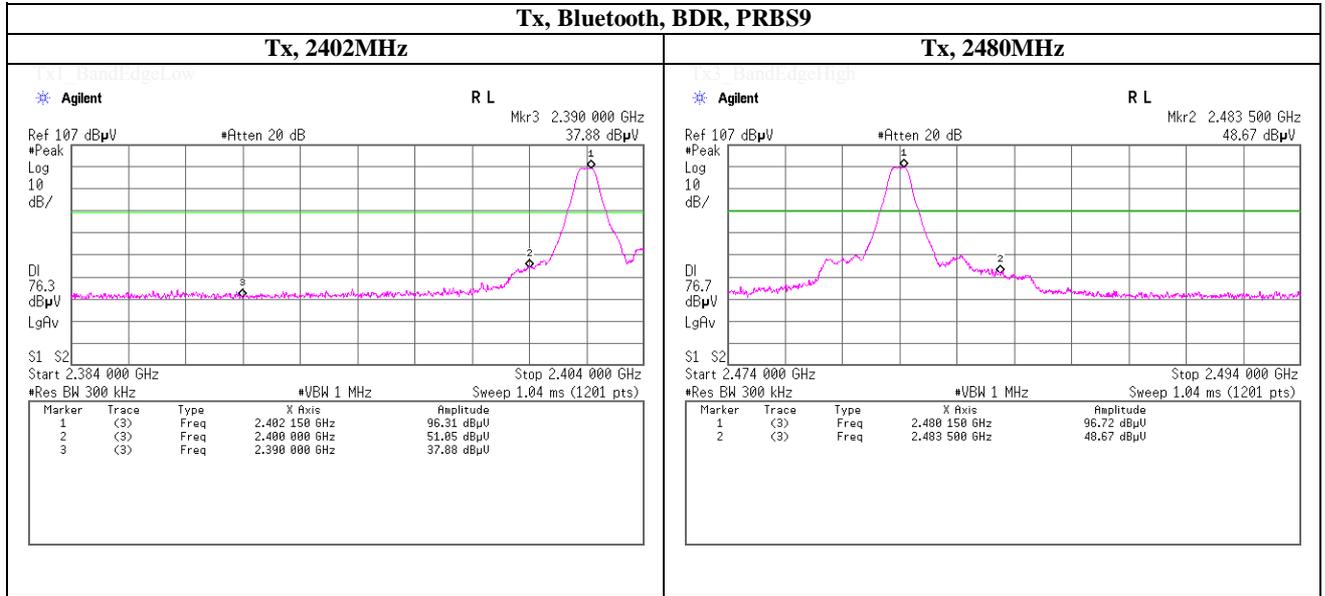
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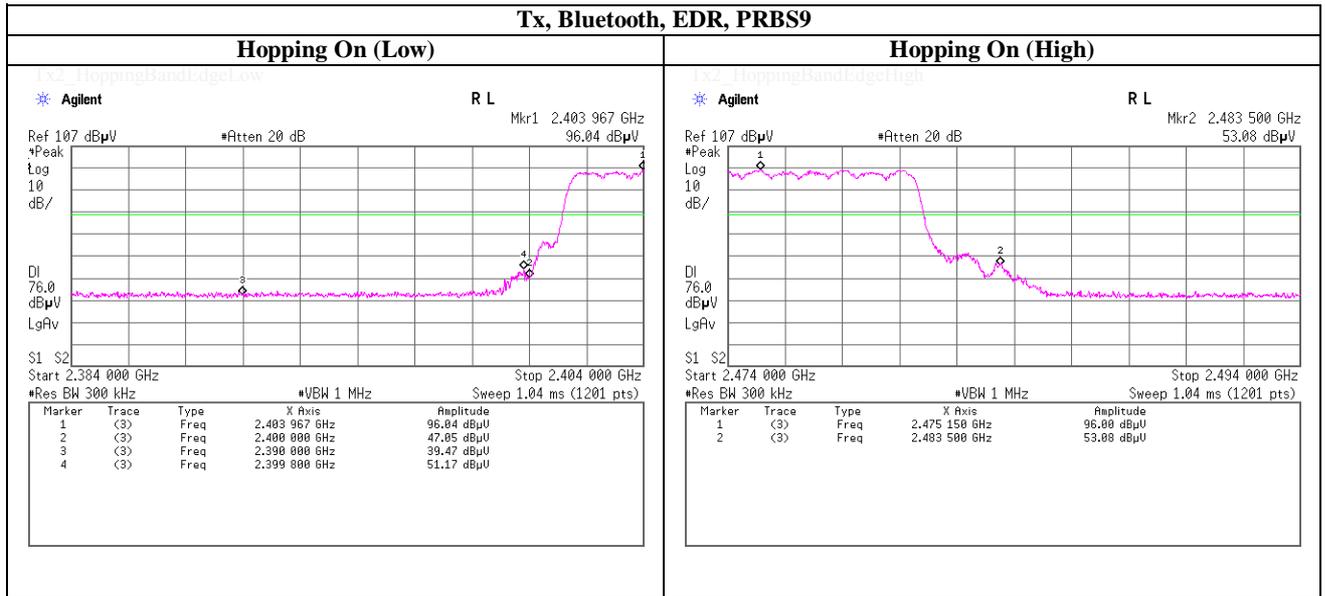
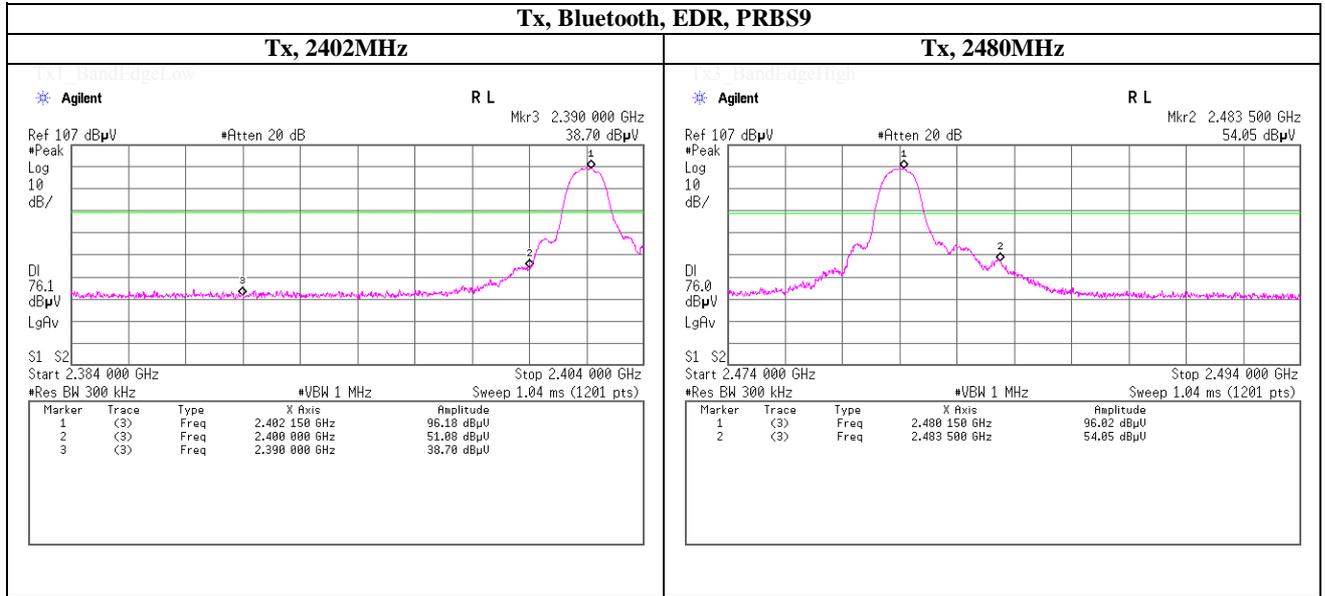
## Spurious emission (Conducted)

### Band Edge compliance



## Spurious emission (Conducted)

### Band Edge compliance



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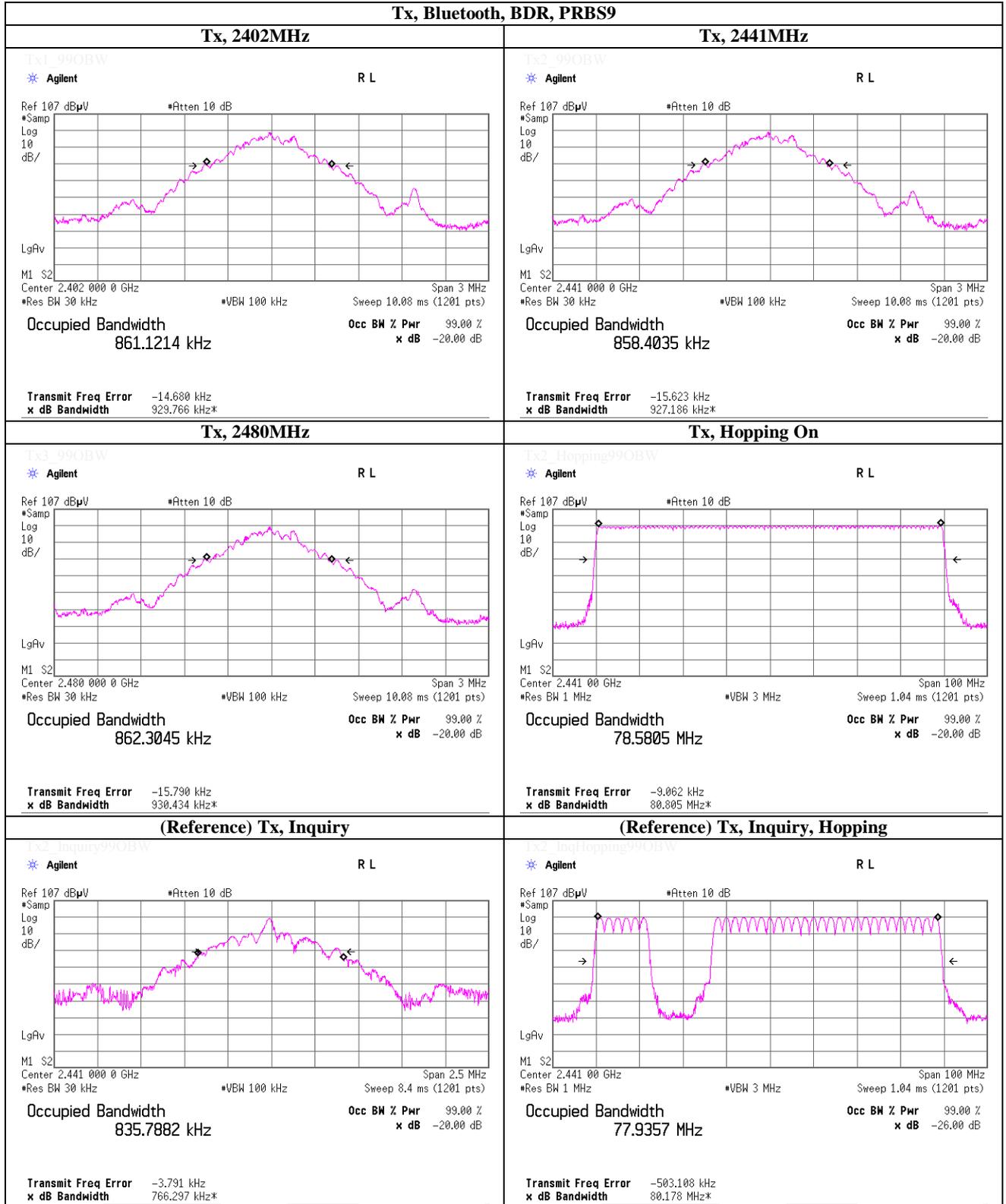
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## 99% Occupied Bandwidth



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### 99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
Tx, 2402MHz	Tx, 2441MHz
<p><b>Tx1_99OBW</b></p> <p>Agilent R L</p> <p>Ref 107 dBµV #Atten 10 dB</p> <p>Center 2.402 000 0 GHz Span 3 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 10.00 ms (1201 pts)</p> <p><b>Occupied Bandwidth</b> 1.1710 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error -8.631 kHz x dB Bandwidth 1.259 MHz*</p>	<p><b>Tx2_99OBW</b></p> <p>Agilent R L</p> <p>Ref 107 dBµV #Atten 10 dB</p> <p>Center 2.441 000 0 GHz Span 3 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 10.00 ms (1201 pts)</p> <p><b>Occupied Bandwidth</b> 1.1770 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error -10.146 kHz x dB Bandwidth 1.261 MHz*</p>
<p><b>Tx3_99OBW</b></p> <p>Agilent R L</p> <p>Ref 107 dBµV #Atten 10 dB</p> <p>Center 2.480 000 0 GHz Span 3 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 10.00 ms (1201 pts)</p> <p><b>Occupied Bandwidth</b> 1.1732 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error -10.303 kHz x dB Bandwidth 1.265 MHz*</p>	<p><b>Tx2_HoppingOn</b></p> <p>Agilent R L</p> <p>Ref 107 dBµV #Atten 10 dB</p> <p>Center 2.441 00 GHz Span 100 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 1.04 ms (1201 pts)</p> <p><b>Occupied Bandwidth</b> 78.7235 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p>Transmit Freq Error -18.684 kHz x dB Bandwidth 81.110 MHz*</p>
<p><b>Tx2_inquiry99OBW</b></p>	<p><b>Tx2_inqHopping99OBW</b></p>

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## APPENDIX 2 Test Instruments

### EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2013/03/28 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2013/03/16 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2013/04/09 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2013/04/09 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2013/04/09 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2013/03/07 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2013/02/12 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2013/02/12 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2012/10/08 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271 (RF Selector)	RE	2013/04/03 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A0901	RE	2012/10/08 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2013/02/27 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2013/02/27 * 12
SJM-11	Measure	PROMART	SEN1935	-	RE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2013/07/09 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,MF)	-	RE	-
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2013/03/04 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2013/03/19 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2013/03/14 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2013/03/16 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2013/07/22 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2013/04/11 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2013/05/22 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2012/08/17 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2013/03/04 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2012/12/18 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2012/12/18 * 12
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						*
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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 :

RE: Radiated emission ,

AT: Antenna terminal conducted test