



RADIO TEST REPORT

Test Report No.: 10115902S-G

Applicant : Sony Corporation
Type of Equipment : Bluetooth Audio System
Model No. : MEX-M70BT
FCC ID : AK8MEXM70BT
Test regulation : FCC Part15 Subpart C: 2013
Test result : Complied

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Date of test: December 3 to 8, 2013

Tested by: 
Kenichi Adachi
Engineer of WiSE Japan,
UL Verification Service

Approved by : 
Toyokazu Imamura
Leader of WiSE Japan,
UL Verification Service



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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 : Bluetooth Audio System
Model Number : MEX-M70BT
Serial Number : Refer to 4.2 of this report.
Rating : DC12V (car battery)
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 : November 22, 2013
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: MEX-M70BT (referred to as the EUT in this report) is a Bluetooth Audio System.

Clock frequency(ies) in the system : 48.000MHz, 36.480MHz, 26.000MHz, 16.9344MHz, 13.333MHz,
32.768kHz, 30.000MHz

Bluetooth specification:

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 : U-FL Type Interchangeability
Antenna gain : 0.929dBi (Peak)
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 September 30, 2013 and effective October 30, 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. Refer to the test report 10115902S-F.

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		8.3dB Freq.: 960.740MHz Polarization: Horizontal Detection: Quasi-Peak Mode: Tx 2441MHz, 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 ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.8 dB	5.0 dB	4.8 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	5.6 dB	5.6 dB
	18GHz-40GHz	5.2 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 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: (±) 1.6dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 1.4dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 2.8dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.5dB

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

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3.5 Test location

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JAB Accreditation No. : RTL02610

	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	-
<input type="checkbox"/> No.1 measurement room	-	-	2.55 x 4.1 x 2.5	-	-

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	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.

The carrier separation may be less than 20 dB bandwidth, therefore 125mW power limit was applied to it.

Software: Blue Suite ver.2.5.0, BlueTest3 ver.2.5.0.93
BtCli ver.2.5.0.93 (Inquiry mode only)

Power Settings: BDR: Ext PA: 23, Int PA: 39
EDR: Ext PA: 73, Int PA: 48

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.

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

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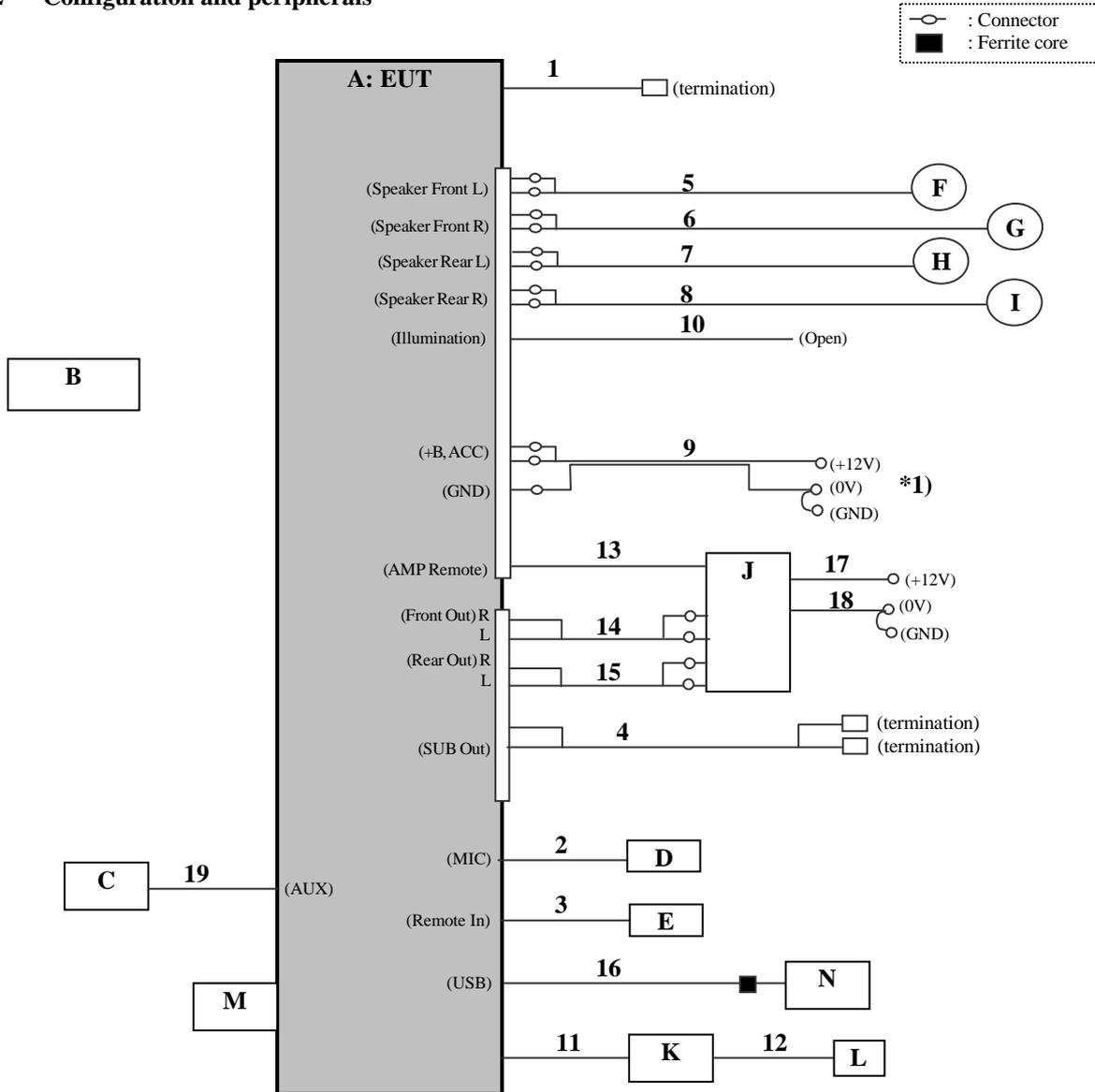
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4.2 Configuration and peripherals



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

*1) DC power supply (Model No.: PAN35-10A) was used for DC 12V input.

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Bluetooth Audio System	MEX-M70BT	*2)	Sony	EUT
B	Remote Commander	RM-X231	-	Sony	-
C	Media Player	ICX-1113	1000200	Sony	-
D	MIC	-	-	Sony	-
E	Wired Remote Controller	RM-X2S	-	Sony	-
F	Speaker 1	XS-GTF1338	-	Sony	-
G	Speaker 2	XS-GTF1338	-	Sony	-
H	Speaker 3	XS-GTF1338	-	Sony	-
I	Speaker 4	XS-GTF1338	-	Sony	-
J	Stereo Power Amplifier	XM-4S	-	Sony	-
K	Sirius XM tuner	SXV100	REG004RR	Sirius	-
L	Antenna for Sirius XM tuner	XVANT1	1046	Sirius	-
M	USB Memory	USM4GL	-	Sony	-
N	USB Memory	USM4GL	-	Sony	-

*2) 13: Antenna terminal conducted tests, 12: Radiated emission tests

List of cables used

No.	Name	Length (m)	Shield- Cable	Shield- Connector	Remarks
1	FM antenna	2.0	Shielded	Shielded	-
2	MIC	4.0	Shielded	Shielded	-
3	REMOTE IN	1.9	Shielded	Shielded	-
4	Audio OUT(SUB)	2.0+0.45	Shielded	Shielded	-
5	Speaker (1)	0.15+2.1	Unshielded	Unshielded	-
6	Speaker (2)	0.15+2.1	Unshielded	Unshielded	-
7	Speaker (3)	0.15+2.1	Unshielded	Unshielded	-
8	Speaker (4)	0.15+2.1	Unshielded	Unshielded	-
9	DC Power	0.15+2.6	Unshielded	Unshielded	-
10	Illumination	0.15+1.9	Unshielded	Unshielded	-
11	XM tuner	0.6	Shielded	Shielded	-
12	Antenna	7.0	Shielded	Shielded	-
13	AMP Remote	0.15+1.6	Unshielded	Unshielded	-
14	RCA (Front Audio Out)	5.0	Shielded	Shielded	-
15	RCA (Rear Audio Out)	5.0	Shielded	Shielded	-
16	USB	1.5	Shielded	Shielded	-
17	DC Power (+)	1.0	Unshielded	Unshielded	-
18	DC Power (-)	1.0	Unshielded	Unshielded	-
19	Audio	2.0	Shielded	Shielded	-

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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 1.5m, 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	1 - 25GHz	
Detection Type	Quasi-Peak	Peak	* Average
IF Bandwidth	120kHz	RBW:1MHz VBW:3MHz	RBW:1MHz VBW:10Hz

* 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 0 to 45 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	45 deg.	0 deg.	45 deg.	0 deg.
Vertical	45 deg.	0 deg.	45 deg.	0 deg.

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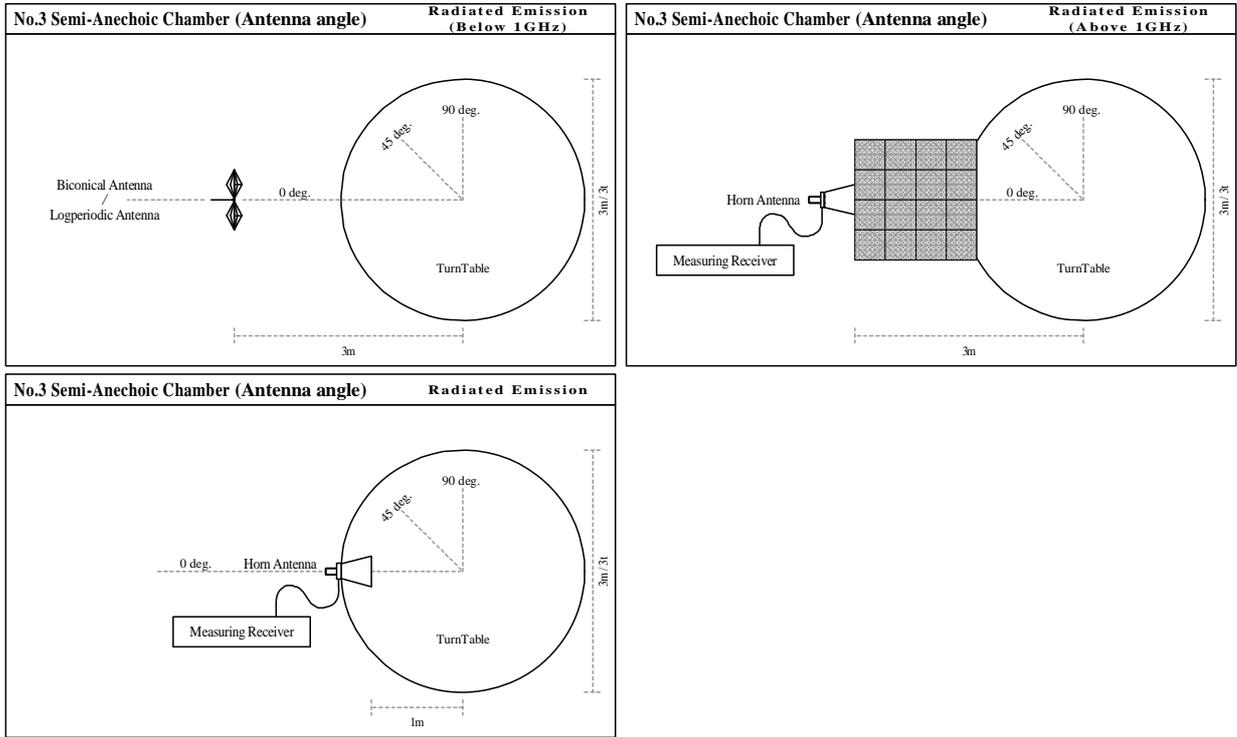
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Figure 1. Antenna angle



11.5 Band edge

Band edge level is below the limits of FCC 15.209. Refer to the data.

11.6 Results

Summary of the test results: Pass *No noise was detected above the 5th 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

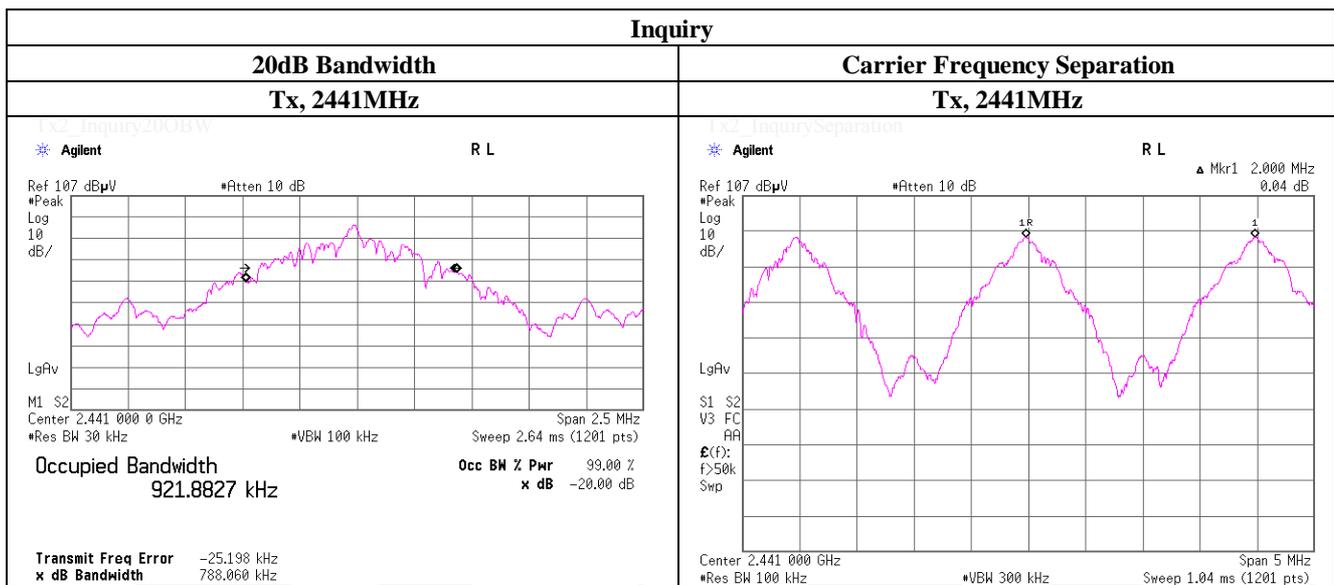
20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 3, 2013	
Temperature / Humidity	25deg.C , 53%RH	
Engineer	Kenichi Adachi	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.960	1.000	>= 0.640
DH5	2441.0	0.959	1.000	>= 0.639
DH5	2480.0	0.992	1.000	>= 0.661
Inquiry	2441.0	0.788	2.000	>= 0.525

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

No limit applies to 20dB Bandwidth.



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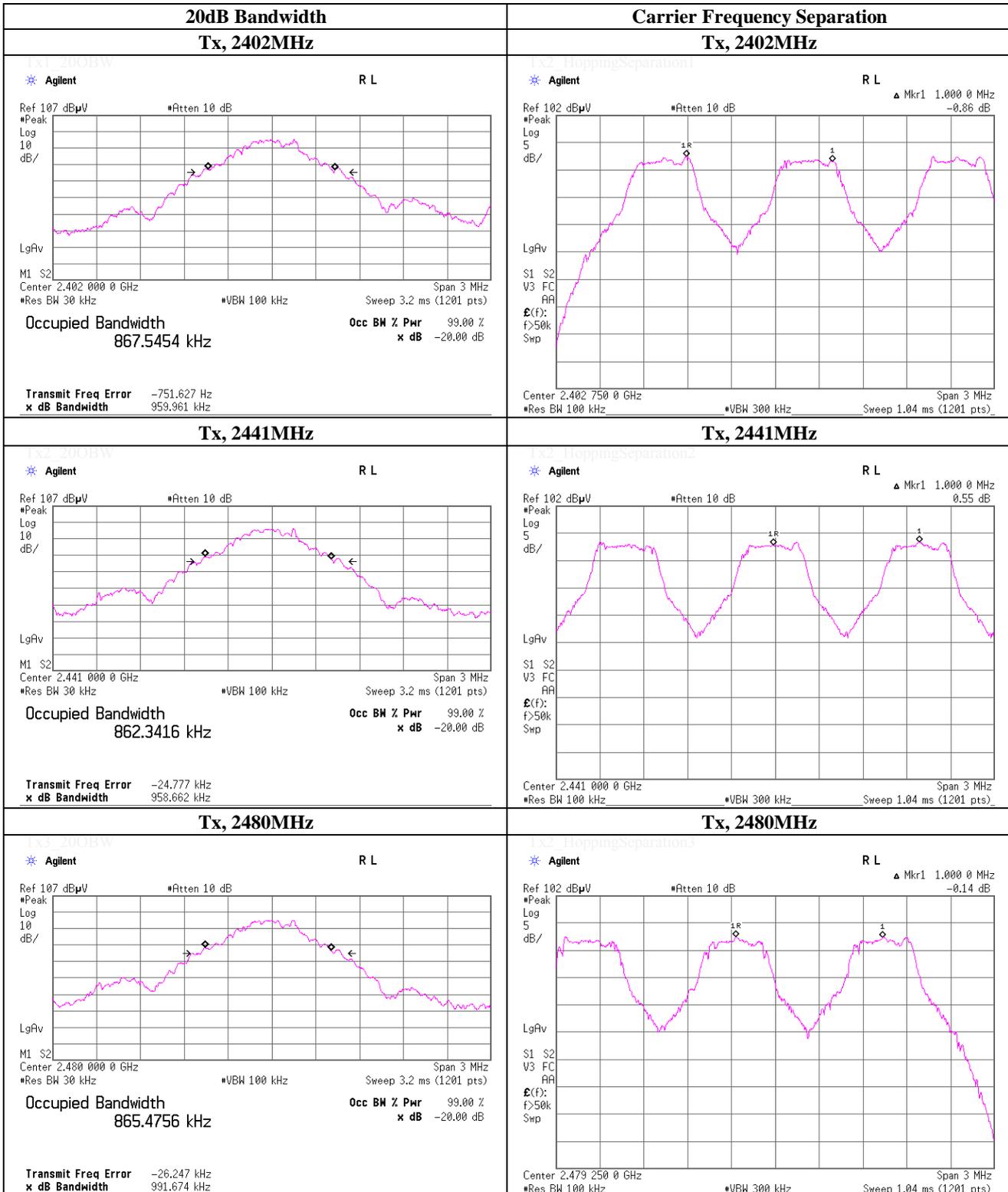
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Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

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 3, 2013
Temperature / Humidity 25deg.C , 53%RH
Engineer Kenichi Adachi
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	1.294	1.000	>= 0.862
3-DH5	2441.0	1.288	1.000	>= 0.859
3-DH5	2480.0	1.291	1.000	>= 0.860

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

No limit applies to 20dB Bandwidth.

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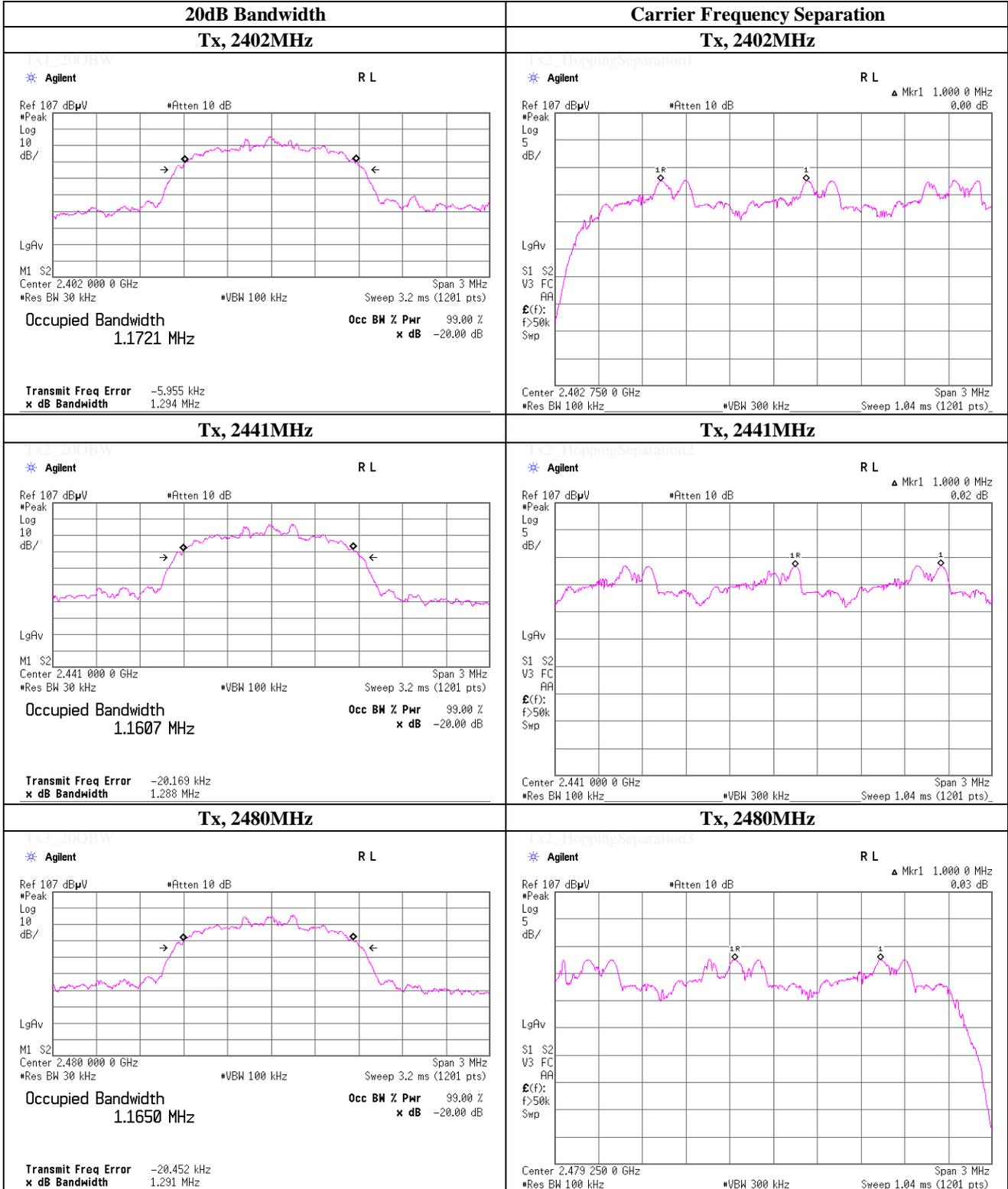
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Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



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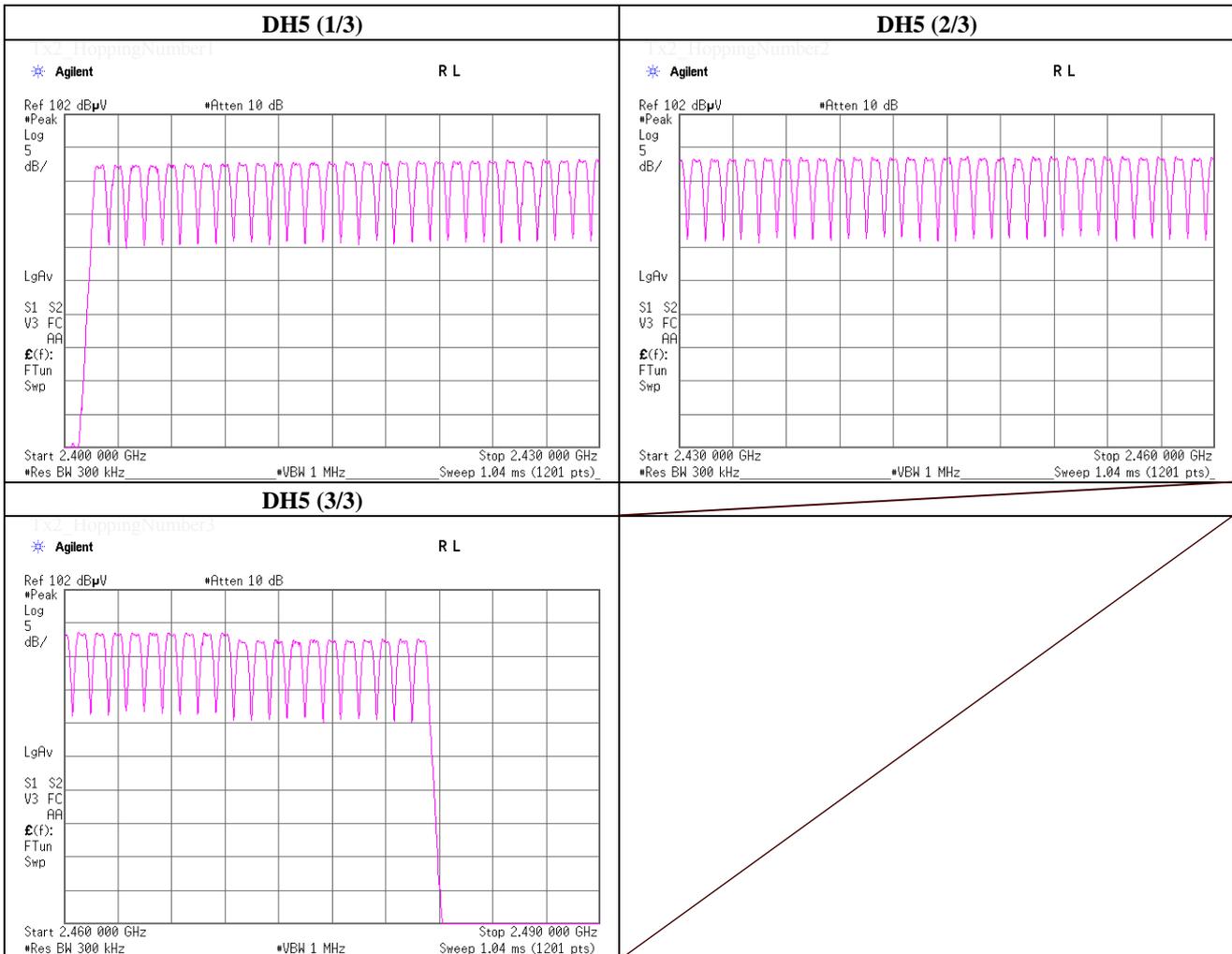
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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 3, 2013	
Temperature / Humidity	25deg.C , 53%RH	
Engineer	Kenichi Adachi	
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.



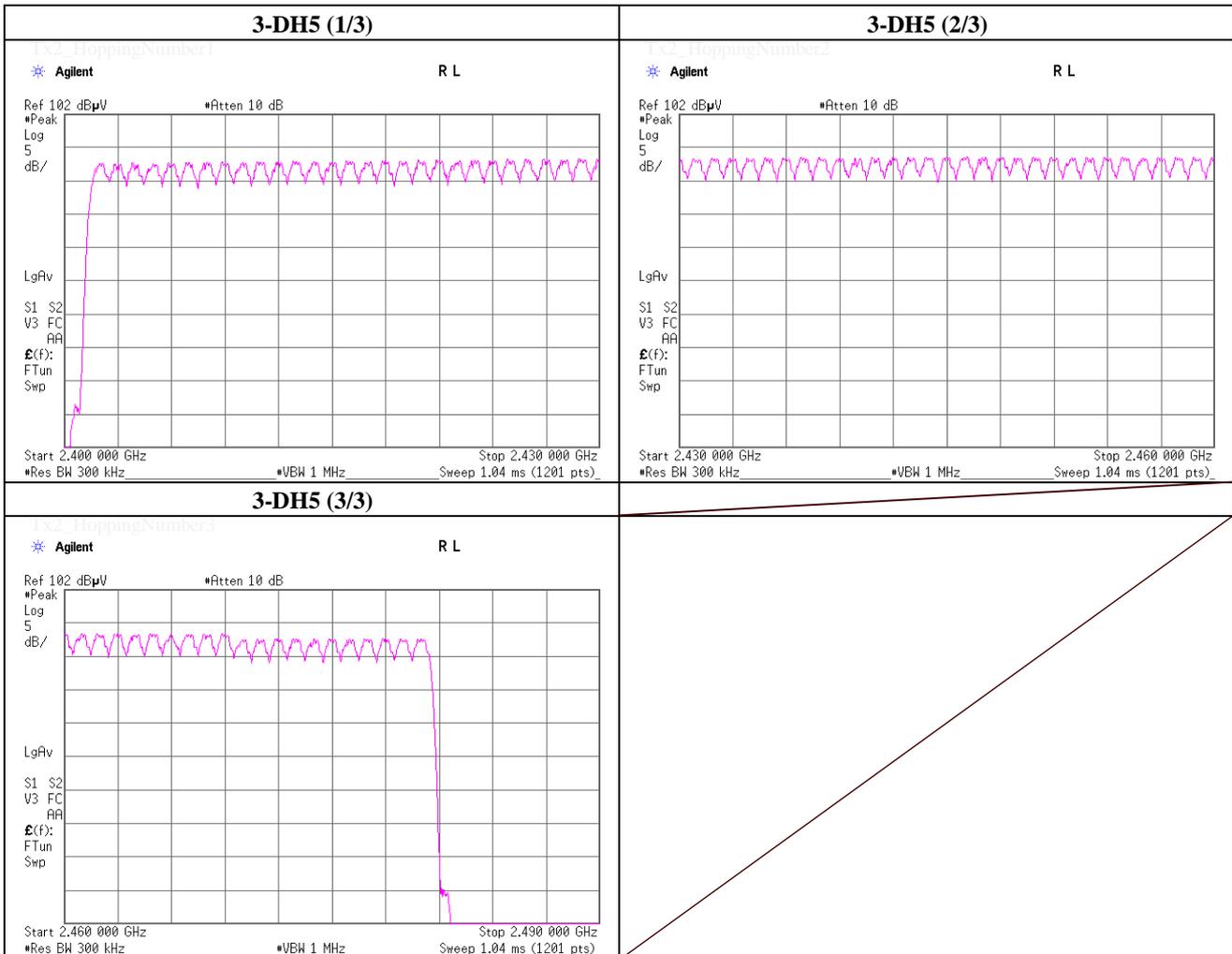
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 Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 3, 2013	
Temperature / Humidity	25deg.C , 53%RH	
Engineer	Kenichi Adachi	
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.

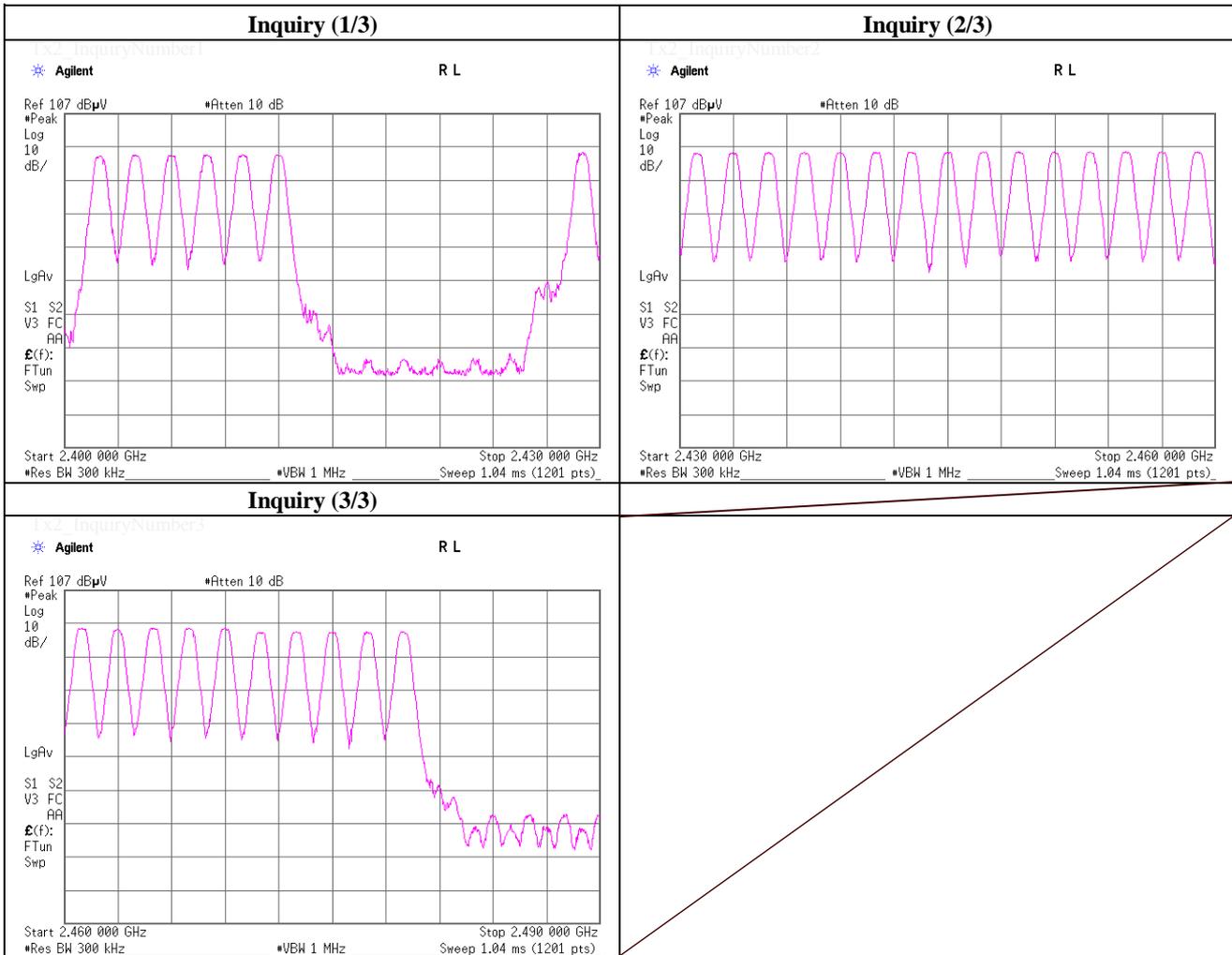


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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 3, 2013	
Temperature / Humidity	25deg.C , 53%RH	
Engineer	Kenichi Adachi	
Mode	Tx, Bluetooth, Inquiry	

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



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Dwell Time

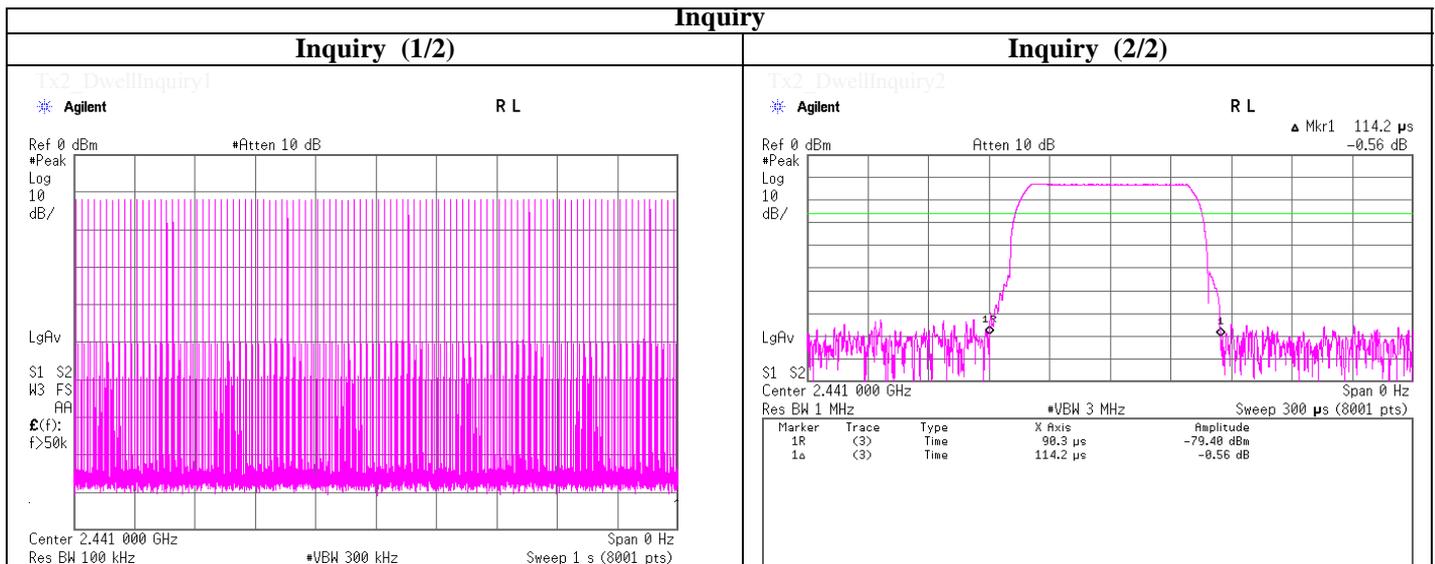
Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	December 3, 2013	
Temperature / Humidity	25deg.C , 53%RH	
Engineer	Kenichi Adachi	
Mode	Tx, Bluetooth, BDR, PRBS9	

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	0.411	133	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.668	275	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.917	315	400
Inquiry	100.0 / 1.0 sec. x 12.8 sec. = 1280 times	0.114	146	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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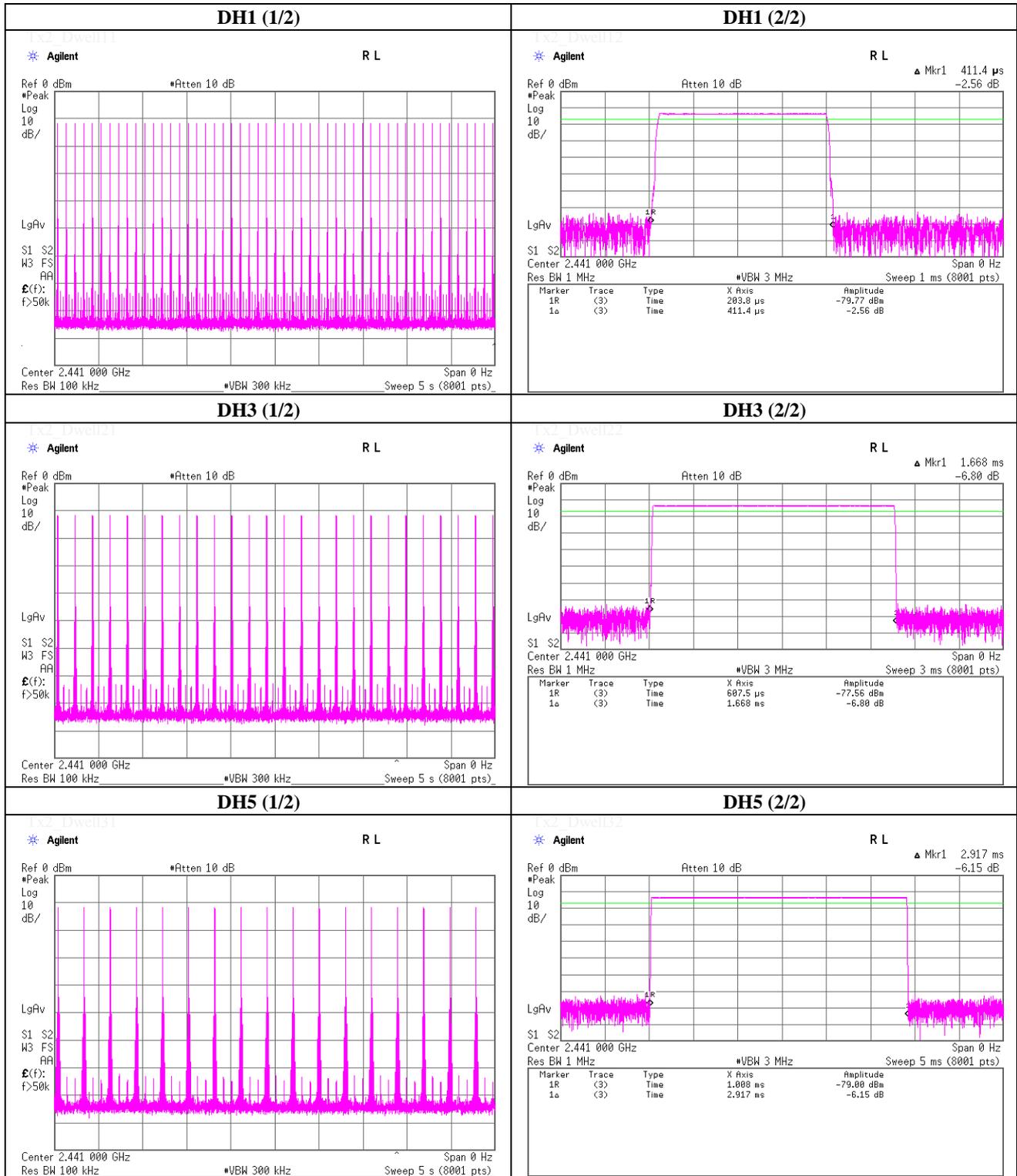
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Facsimile : +81 463 50 6401

Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg C, 53%RH
 Engineer : Kenichi Adachi

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 3, 2013
 Temperature / Humidity 25deg.C , 53%RH
 Engineer Kenichi Adachi
 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	0.430	139	400
3-DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.681	277	400
3-DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.931	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 $N=79$.

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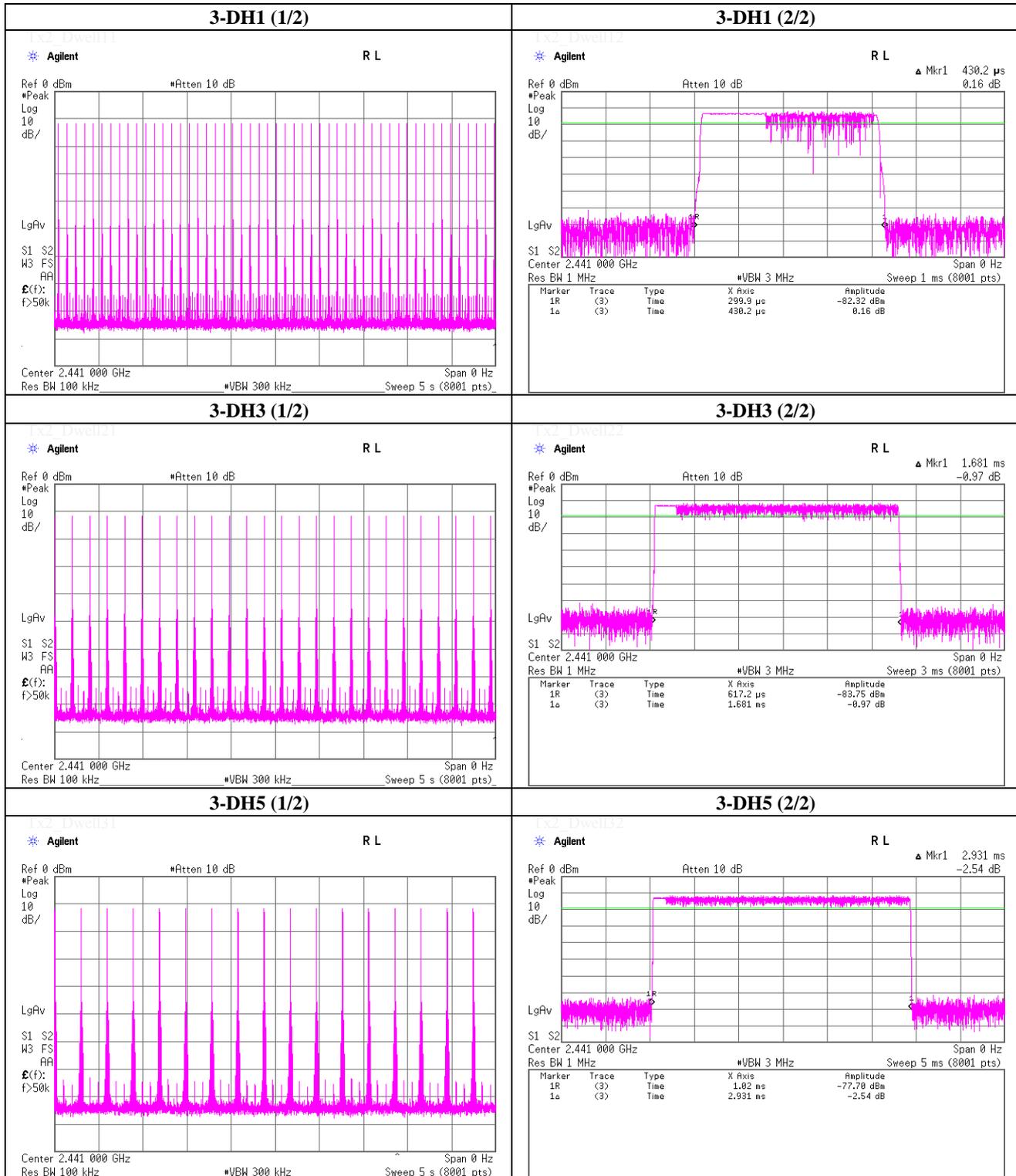
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Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

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 December 3, 2013
 Temperature / Humidity 25deg.C , 53%RH
 Engineer Kenichi Adachi
 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	-12.41	1.73	9.98	-0.70	0.85	20.97	125	21.67
DH5	2441.0	-11.37	1.74	9.98	0.35	1.08	20.97	125	20.62
DH5	2480.0	-12.35	1.76	9.98	-0.61	0.87	20.97	125	21.58
2-DH5	2402.0	-11.85	1.73	9.98	-0.14	0.97	20.97	125	21.11
2-DH5	2441.0	-10.98	1.74	9.98	0.74	1.19	20.97	125	20.23
2-DH5	2480.0	-11.95	1.76	9.98	-0.21	0.95	20.97	125	21.18
3-DH5	2402.0	-11.61	1.73	9.98	0.10	1.02	20.97	125	20.87
3-DH5	2441.0	-10.76	1.74	9.98	0.96	1.25	20.97	125	20.01
3-DH5	2480.0	-11.72	1.76	9.98	0.02	1.00	20.97	125	20.95

Sample Calculation:

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

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Radiated Emission

Test place No.3 Semi Anechoic Chamber
 Date December 7, 2013 December 8, 2013
 Temperature / Humidity 23 deg.C, 26 %RH 23 deg.C, 26 %RH
 Engineer Shinichi Takano Shinichi Takano
 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.	47.930	QP	40.0	11.3	6.7	32.2	25.8	40.0	14.2	222	183	
Hori.	335.671	QP	41.4	16.4	8.7	31.9	34.6	46.0	11.4	150	39	
Hori.	720.083	QP	32.5	22.0	10.2	31.8	32.9	46.0	13.1	150	232	
Hori.	960.799	QP	40.2	24.8	11.0	30.5	45.5	53.9	8.4	100	238	
Hori.	1920.108	PK	49.3	26.5	14.2	41.2	48.8	73.9	25.1	110	295	
Hori.	2272.040	PK	45.4	26.7	14.6	41.2	45.5	73.9	28.4	100	146	
Hori.	2390.000	PK	45.7	26.8	14.7	41.1	46.1	73.9	27.8	100	146	
Hori.	2399.326	PK	46.1	26.8	14.7	41.1	46.5	73.9	27.4	100	146	
Hori.	2400.000	PK	47.1	26.8	14.7	41.1	47.5	73.9	26.4	100	146	
Hori.	2506.002	PK	47.6	26.9	14.9	41.0	48.4	73.9	25.5	100	146	
Hori.	4804.000	PK	50.1	30.9	7.4	41.2	47.2	73.9	26.7	100	136	
Hori.	7206.000	PK	46.7	37.1	8.8	41.0	51.6	73.9	22.3	100	0	
Hori.	9608.000	PK	45.3	38.6	10.0	38.9	55.0	73.9	18.9	100	0	
Hori.	12010.000	PK	45.6	39.6	10.8	39.1	56.9	73.9	17.0	100	0	
Hori.	1920.108	AV	42.3	26.5	14.2	41.2	41.8	53.9	12.1	110	295	
Hori.	2272.040	AV	35.1	26.7	14.6	41.2	35.2	53.9	18.7	100	146	
Hori.	2390.000	AV	34.6	26.8	14.7	41.1	35.0	53.9	18.9	100	146	
Hori.	2399.326	AV	34.3	26.8	14.7	41.1	34.7	53.9	19.2	100	146	
Hori.	2400.000	AV	34.5	26.8	14.7	41.1	34.9	53.9	19.0	100	146	
Hori.	2506.002	AV	36.5	26.9	14.9	41.0	37.3	53.9	16.6	100	146	
Hori.	4804.000	AV	41.4	30.9	7.4	41.2	38.5	53.9	15.4	100	136	
Hori.	7206.000	AV	35.4	37.1	8.8	41.0	40.3	53.9	13.6	100	0	
Hori.	9608.000	AV	33.4	38.6	10.0	38.9	43.1	53.9	10.8	100	0	
Hori.	12010.000	AV	34.2	39.6	10.8	39.1	45.5	53.9	8.4	100	0	
Vert.	48.020	QP	39.2	11.3	6.7	32.2	25.0	40.0	15.0	100	76	
Vert.	135.351	QP	36.5	14.2	7.4	32.1	26.0	43.5	17.5	100	173	
Vert.	960.789	QP	34.5	24.8	11.0	30.5	39.8	53.9	14.1	100	165	
Vert.	1920.140	PK	48.2	26.5	14.2	41.2	47.7	73.9	26.2	100	186	
Vert.	2271.998	PK	47.7	26.7	14.6	41.2	47.8	73.9	26.1	109	359	
Vert.	2390.000	PK	46.3	26.8	14.7	41.1	46.7	73.9	27.2	174	216	
Vert.	2399.288	PK	46.5	26.8	14.7	41.1	46.9	73.9	27.0	174	216	
Vert.	2400.000	PK	47.0	26.8	14.7	41.1	47.4	73.9	26.5	174	216	
Vert.	2505.991	PK	48.0	26.9	14.9	41.0	48.8	73.9	25.1	125	216	
Vert.	4804.000	PK	51.3	30.9	7.4	41.2	48.4	73.9	25.5	100	173	
Vert.	7206.000	PK	47.0	37.1	8.8	41.0	51.9	73.9	22.0	100	0	
Vert.	9608.000	PK	44.6	38.6	10.0	38.9	54.3	73.9	19.6	100	0	
Vert.	12010.000	PK	45.3	39.6	10.8	39.1	56.6	73.9	17.3	100	0	
Vert.	1920.140	AV	39.0	26.5	14.2	41.2	38.5	53.9	15.4	100	186	
Vert.	2271.998	AV	36.4	26.7	14.6	41.2	36.5	53.9	17.4	109	359	
Vert.	2390.000	AV	34.6	26.8	14.7	41.1	35.0	53.9	18.9	174	216	
Vert.	2399.288	AV	34.6	26.8	14.7	41.1	35.0	53.9	18.9	174	216	
Vert.	2400.000	AV	34.9	26.8	14.7	41.1	35.3	53.9	18.6	174	216	
Vert.	2505.991	AV	38.0	26.9	14.9	41.0	38.8	53.9	15.1	125	216	
Vert.	4804.000	AV	43.0	30.9	7.4	41.2	40.1	53.9	13.8	100	173	
Vert.	7206.000	AV	35.4	37.1	8.8	41.0	40.3	53.9	13.6	100	0	
Vert.	9608.000	AV	33.3	38.6	10.0	38.9	43.0	53.9	10.9	100	0	
Vert.	12010.000	AV	34.1	39.6	10.8	39.1	45.4	53.9	8.5	100	0	

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 7, 2013 December 8, 2013
 Temperature / Humidity 23 deg.C, 26 %RH 23 deg.C, 26 %RH
 Engineer Shinichi Takano Shinichi Takano
 Mode Tx, 2441 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.	95.926	QP	44.0	9.4	7.4	32.1	28.7	43.5	14.8	300	275	
Hori.	335.700	QP	41.2	16.4	8.7	31.9	34.4	46.0	11.6	100	44	
Hori.	479.907	QP	38.9	18.4	9.4	31.9	34.8	46.0	11.2	150	201	
Hori.	960.740	QP	40.3	24.8	11.0	30.5	45.6	53.9	8.3	100	258	
Hori.	1920.118	PK	49.4	26.5	14.2	41.2	48.9	73.9	25.0	109	296	
Hori.	2336.965	PK	46.8	26.8	14.6	41.1	47.1	73.9	26.8	100	137	
Hori.	2544.989	PK	47.9	27.0	15.0	41.1	48.8	73.9	25.1	100	148	
Hori.	4882.000	PK	50.6	31.4	7.4	41.1	48.3	73.9	25.6	117	147	
Hori.	7323.000	PK	46.3	37.2	8.8	41.1	51.2	73.9	22.7	100	0	
Hori.	9764.000	PK	44.0	38.8	10.0	38.8	54.0	73.9	19.9	100	0	
Hori.	12205.000	PK	44.8	39.6	10.9	39.1	56.2	73.9	17.7	100	0	
Hori.	1920.118	AV	42.2	26.5	14.2	41.2	41.7	53.9	12.2	109	296	
Hori.	2336.965	AV	35.2	26.8	14.6	41.1	35.5	53.9	18.4	100	137	
Hori.	2544.989	AV	37.8	27.0	15.0	41.1	38.7	53.9	15.2	100	148	
Hori.	4882.000	AV	41.9	31.4	7.4	41.1	39.6	53.9	14.3	117	147	
Hori.	7323.000	AV	35.4	37.2	8.8	41.1	40.3	53.9	13.6	100	0	
Hori.	9764.000	AV	32.7	38.8	10.0	38.8	42.7	53.9	11.2	100	0	
Hori.	12205.000	AV	33.1	39.6	10.9	39.1	44.5	53.9	9.4	100	0	
Vert.	38.295	QP	39.9	15.1	6.5	32.2	29.3	40.0	10.7	100	6	
Vert.	47.902	QP	38.9	11.3	6.7	32.2	24.7	40.0	15.3	100	103	
Vert.	1920.124	PK	48.4	26.5	14.2	41.2	47.9	73.9	26.0	100	191	
Vert.	2336.958	PK	47.0	26.8	14.6	41.1	47.3	73.9	26.6	100	353	
Vert.	2544.958	PK	47.9	27.0	15.0	41.1	48.8	73.9	25.1	100	223	
Vert.	4882.000	PK	50.5	31.4	7.4	41.1	48.2	73.9	25.7	100	177	
Vert.	7323.000	PK	46.8	37.2	8.8	41.1	51.7	73.9	22.2	100	0	
Vert.	9764.000	PK	44.4	38.8	10.0	38.8	54.4	73.9	19.5	100	0	
Vert.	12205.000	PK	44.2	39.6	10.9	39.1	55.6	73.9	18.3	100	0	
Vert.	1920.124	AV	39.2	26.5	14.2	41.2	38.7	53.9	15.2	100	191	
Vert.	2336.958	AV	36.9	26.8	14.6	41.1	37.2	53.9	16.7	100	353	
Vert.	2544.958	AV	37.6	27.0	15.0	41.1	38.5	53.9	15.4	100	223	
Vert.	4882.000	AV	42.1	31.4	7.4	41.1	39.8	53.9	14.1	100	177	
Vert.	7323.000	AV	35.2	37.2	8.8	41.1	40.1	53.9	13.8	100	0	
Vert.	9764.000	AV	32.9	38.8	10.0	38.8	42.9	53.9	11.0	100	0	
Vert.	12205.000	AV	33.2	39.6	10.9	39.1	44.6	53.9	9.3	100	0	

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 7, 2013 December 8, 2013
 Temperature / Humidity 23 deg.C, 26 %RH 23 deg.C, 26 %RH
 Engineer Shinichi Takano Shinichi Takano
 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.	95.891	QP	44.2	9.2	7.4	32.1	28.7	43.5	14.8	300	261	
Hori.	335.690	QP	41.0	14.7	8.7	31.9	32.5	46.0	13.5	100	44	
Hori.	479.909	QP	39.1	17.1	9.4	31.9	33.7	46.0	12.3	150	22	
Hori.	960.755	QP	40.5	22.1	11.0	30.5	43.1	53.9	10.8	100	276	
Hori.	1920.126	PK	50.2	26.5	14.2	41.2	49.7	73.9	24.2	109	296	
Hori.	2349.965	PK	47.4	26.8	14.7	41.1	47.8	73.9	26.1	129	156	
Hori.	2483.500	PK	47.0	26.9	14.8	41.0	47.7	73.9	26.2	100	171	
Hori.	2483.767	PK	45.9	26.9	14.8	41.0	46.6	73.9	27.3	100	171	
Hori.	2584.013	PK	48.2	27.1	15.0	41.1	49.2	73.9	24.7	100	152	
Hori.	4960.000	PK	49.1	31.8	7.4	41.1	47.2	73.9	26.7	100	141	
Hori.	7440.000	PK	47.7	37.4	8.9	41.1	52.9	73.9	21.0	100	0	
Hori.	9920.000	PK	43.1	38.9	9.9	38.8	53.1	73.9	20.8	100	0	
Hori.	12400.000	PK	43.8	39.7	11.0	39.1	55.4	73.9	18.5	100	0	
Hori.	1920.126	AV	42.1	26.5	14.2	41.2	41.6	53.9	12.3	109	296	
Hori.	2349.965	AV	36.6	26.8	14.7	41.1	37.0	53.9	16.9	129	156	
Hori.	2483.500	AV	34.5	26.9	14.8	41.0	35.2	53.9	18.7	100	171	
Hori.	2483.767	AV	34.2	26.9	14.8	41.0	34.9	53.9	19.0	100	171	
Hori.	2584.013	AV	38.4	27.1	15.0	41.1	39.4	53.9	14.5	100	152	
Hori.	4960.000	AV	39.4	31.8	7.4	41.1	37.5	53.9	16.4	100	141	
Hori.	7440.000	AV	35.0	37.4	8.9	41.1	40.2	53.9	13.7	100	0	
Hori.	9920.000	AV	32.2	38.9	9.9	38.8	42.2	53.9	11.7	100	0	
Hori.	12400.000	AV	32.2	39.7	11.0	39.1	43.8	53.9	10.1	100	0	
Vert.	38.393	QP	40.3	15.1	6.5	32.2	29.7	40.0	10.3	100	354	
Vert.	47.947	QP	39.2	11.6	6.7	32.2	25.3	40.0	14.7	100	101	
Vert.	1920.132	PK	49.2	26.5	14.2	41.2	48.7	73.9	25.2	100	186	
Vert.	2349.990	PK	49.5	26.8	14.7	41.1	49.9	73.9	24.0	100	352	
Vert.	2483.500	PK	47.3	26.9	14.8	41.0	48.0	73.9	25.9	100	228	
Vert.	2483.767	PK	47.1	26.9	14.8	41.0	47.8	73.9	26.1	100	228	
Vert.	2583.980	PK	48.5	27.1	15.0	41.1	49.5	73.9	24.4	100	12	
Vert.	4960.000	PK	49.6	31.8	7.4	41.1	47.7	73.9	26.2	100	176	
Vert.	7440.000	PK	47.2	37.4	8.9	41.1	52.4	73.9	21.5	100	0	
Vert.	9920.000	PK	43.4	38.9	9.9	38.8	53.4	73.9	20.5	100	0	
Vert.	12400.000	PK	43.4	39.7	11.0	39.1	55.0	73.9	18.9	100	0	
Vert.	1920.132	AV	39.5	26.5	14.2	41.2	39.0	53.9	14.9	100	186	
Vert.	2349.990	AV	37.9	26.8	14.7	41.1	38.3	53.9	15.6	100	352	
Vert.	2483.500	AV	34.7	26.9	14.8	41.0	35.4	53.9	18.5	100	228	
Vert.	2483.767	AV	34.3	26.9	14.8	41.0	35.0	53.9	18.9	100	228	
Vert.	2583.980	AV	38.1	27.1	15.0	41.1	39.1	53.9	14.8	100	12	
Vert.	4960.000	AV	40.2	31.8	7.4	41.1	38.3	53.9	15.6	100	176	
Vert.	7440.000	AV	34.9	37.4	8.9	41.1	40.1	53.9	13.8	100	0	
Vert.	9920.000	AV	32.0	38.9	9.9	38.8	42.0	53.9	11.9	100	0	
Vert.	12400.000	AV	32.4	39.7	11.0	39.1	44.0	53.9	9.9	100	0	

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 7, 2013 December 8, 2013
Temperature / Humidity 23 deg.C, 26 %RH 23 deg.C, 26 %RH
Engineer Shinichi Takano Shinichi Takano
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.	56.188	QP	41.1	9.1	6.6	32.2	24.6	40.0	15.4	300	96	
Hori.	95.876	QP	44.2	9.2	7.4	32.1	28.7	43.5	14.8	300	262	
Hori.	335.612	QP	41.0	14.7	8.7	31.9	32.5	46.0	13.5	150	40	
Hori.	960.754	QP	40.1	22.1	11.0	30.5	42.7	53.9	11.2	100	214	
Hori.	1920.124	PK	49.6	26.5	14.2	41.2	49.1	73.9	24.8	111	296	
Hori.	2272.180	PK	46.6	26.7	14.6	41.2	46.7	73.9	27.2	100	147	
Hori.	2390.000	PK	46.8	26.8	14.7	41.1	47.2	73.9	26.7	100	147	
Hori.	2400.000	PK	50.1	26.8	14.7	41.1	50.5	73.9	23.4	100	147	
Hori.	2506.030	PK	46.5	26.9	14.9	41.0	47.3	73.9	26.6	100	147	
Hori.	4804.000	PK	49.6	30.9	7.4	41.2	46.7	73.9	27.2	126	142	
Hori.	7206.000	PK	46.0	37.1	8.8	41.0	50.9	73.9	23.0	100	0	
Hori.	9608.000	PK	46.2	38.6	10.0	38.9	55.9	73.9	18.0	100	0	
Hori.	12010.000	PK	45.9	39.6	10.8	39.1	57.2	73.9	16.7	100	0	
Hori.	1920.124	AV	42.4	26.5	14.2	41.2	41.9	53.9	12.0	111	296	
Hori.	2272.180	AV	34.9	26.7	14.6	41.2	35.0	53.9	18.9	100	147	
Hori.	2390.000	AV	34.6	26.8	14.7	41.1	35.0	53.9	18.9	100	147	
Hori.	2400.000	AV	36.1	26.8	14.7	41.1	36.5	53.9	17.4	100	147	
Hori.	2506.030	AV	35.5	26.9	14.9	41.0	36.3	53.9	17.6	100	147	
Hori.	4804.000	AV	38.7	30.9	7.4	41.2	35.8	53.9	18.1	126	142	
Hori.	7206.000	AV	35.3	37.1	8.8	41.0	40.2	53.9	13.7	100	0	
Hori.	9608.000	AV	33.6	38.6	10.0	38.9	43.3	53.9	10.6	100	0	
Hori.	12010.000	AV	33.8	39.6	10.8	39.1	45.1	53.9	8.8	100	0	
Vert.	37.543	QP	38.9	15.5	6.5	32.2	28.7	40.0	11.3	100	31	
Vert.	47.935	QP	38.9	11.6	6.7	32.2	25.0	40.0	15.0	100	106	
Vert.	1920.146	PK	48.7	26.5	14.2	41.2	48.2	73.9	25.7	100	182	
Vert.	2271.962	PK	47.4	26.7	14.6	41.2	47.5	73.9	26.4	105	353	
Vert.	2390.000	PK	45.9	26.8	14.7	41.1	46.3	73.9	27.6	172	217	
Vert.	2400.000	PK	51.7	26.8	14.7	41.1	52.1	73.9	21.8	172	217	
Vert.	2505.984	PK	47.3	26.9	14.9	41.0	48.1	73.9	25.8	120	222	
Vert.	4804.000	PK	50.1	30.9	7.4	41.2	47.2	73.9	26.7	100	175	
Vert.	7206.000	PK	46.3	37.1	8.8	41.0	51.2	73.9	22.7	100	0	
Vert.	9608.000	PK	45.5	38.6	10.0	38.9	55.2	73.9	18.7	100	0	
Vert.	12010.000	PK	45.3	39.6	10.8	39.1	56.6	73.9	17.3	100	0	
Vert.	1920.146	AV	39.2	26.5	14.2	41.2	38.7	53.9	15.2	100	182	
Vert.	2271.962	AV	35.8	26.7	14.6	41.2	35.9	53.9	18.0	105	353	
Vert.	2390.000	AV	34.7	26.8	14.7	41.1	35.1	53.9	18.8	172	217	
Vert.	2400.000	AV	37.5	26.8	14.7	41.1	37.9	53.9	16.0	172	217	
Vert.	2505.984	AV	36.7	26.9	14.9	41.0	37.5	53.9	16.4	120	222	
Vert.	4804.000	AV	39.2	30.9	7.4	41.2	36.3	53.9	17.6	100	175	
Vert.	7206.000	AV	35.4	37.1	8.8	41.0	40.3	53.9	13.6	100	0	
Vert.	9608.000	AV	33.6	38.6	10.0	38.9	43.3	53.9	10.6	100	0	
Vert.	12010.000	AV	34.0	39.6	10.8	39.1	45.3	53.9	8.6	100	0	

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 7, 2013 December 8, 2013
 Temperature / Humidity 23 deg.C, 26 %RH 23 deg.C, 26 %RH
 Engineer Shinichi Takano Shinichi Takano
 Mode Tx, 2441 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.	55.410	QP	41.2	9.3	6.7	32.2	25.0	40.0	15.0	300	272	
Hori.	479.894	QP	39.0	17.1	9.4	31.9	33.6	46.0	12.4	100	221	
Hori.	960.776	QP	40.5	22.1	11.0	30.5	43.1	53.9	10.8	100	214	
Hori.	1920.126	PK	49.1	26.5	14.2	41.2	48.6	73.9	25.3	110	301	
Hori.	2337.006	PK	46.5	26.8	14.6	41.1	46.8	73.9	27.1	100	136	
Hori.	2570.954	PK	46.8	27.1	15.0	41.1	47.8	73.9	26.1	100	150	
Hori.	4882.000	PK	49.2	31.4	7.4	41.1	46.9	73.9	27.0	118	140	
Hori.	7323.000	PK	47.5	37.2	8.8	41.1	52.4	73.9	21.5	100	0	
Hori.	9764.000	PK	44.9	38.8	10.0	38.8	54.9	73.9	19.0	100	0	
Hori.	12205.000	PK	44.1	39.6	10.9	39.1	55.5	73.9	18.4	100	0	
Hori.	1920.126	AV	42.0	26.5	14.2	41.2	41.5	53.9	12.4	110	301	
Hori.	2337.006	AV	34.8	26.8	14.6	41.1	35.1	53.9	18.8	100	136	
Hori.	2570.954	AV	36.4	27.1	15.0	41.1	37.4	53.9	16.5	100	150	
Hori.	4882.000	AV	38.2	31.4	7.4	41.1	35.9	53.9	18.0	118	140	
Hori.	7323.000	AV	35.1	37.2	8.8	41.1	40.0	53.9	13.9	100	0	
Hori.	9764.000	AV	32.8	38.8	10.0	38.8	42.8	53.9	11.1	100	0	
Hori.	12205.000	AV	33.0	39.6	10.9	39.1	44.4	53.9	9.5	100	0	
Vert.	41.937	QP	39.9	13.8	6.7	32.2	28.2	40.0	11.8	100	70	
Vert.	47.851	QP	39.0	11.6	6.7	32.2	25.1	40.0	14.9	100	123	
Vert.	55.349	QP	42.1	9.3	6.7	32.2	25.9	40.0	14.1	100	70	
Vert.	1920.134	PK	49.0	26.5	14.2	41.2	48.5	73.9	25.4	100	193	
Vert.	2336.994	PK	47.6	26.8	14.6	41.1	47.9	73.9	26.0	100	352	
Vert.	2570.973	PK	46.9	27.1	15.0	41.1	47.9	73.9	26.0	100	232	
Vert.	4882.000	PK	49.3	31.4	7.4	41.1	47.0	73.9	26.9	100	175	
Vert.	7323.000	PK	47.1	37.2	8.8	41.1	52.0	73.9	21.9	100	0	
Vert.	9764.000	PK	44.2	38.8	10.0	38.8	54.2	73.9	19.7	100	0	
Vert.	12205.000	PK	44.7	39.6	10.9	39.1	56.1	73.9	17.8	100	0	
Vert.	1920.134	AV	39.4	26.5	14.2	41.2	38.9	53.9	15.0	100	193	
Vert.	2336.994	AV	35.8	26.8	14.6	41.1	36.1	53.9	17.8	100	352	
Vert.	2570.973	AV	35.7	27.1	15.0	41.1	36.7	53.9	17.2	100	232	
Vert.	4882.000	AV	38.5	31.4	7.4	41.1	36.2	53.9	17.7	100	175	
Vert.	7323.000	AV	35.1	37.2	8.8	41.1	40.0	53.9	13.9	100	0	
Vert.	9764.000	AV	32.8	38.8	10.0	38.8	42.8	53.9	11.1	100	0	
Vert.	12205.000	AV	33.2	39.6	10.9	39.1	44.6	53.9	9.3	100	0	

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 7, 2013 December 8, 2013
 Temperature / Humidity 23 deg.C, 26 %RH 23 deg.C, 26 %RH
 Engineer Shinichi Takano Shinichi Takano
 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.	55.653	QP	41.2	9.3	6.6	32.2	24.9	40.0	15.1	300	317	
Hori.	95.913	QP	44.5	9.2	7.4	32.1	29.0	43.5	14.5	200	260	
Hori.	335.708	QP	42.0	14.7	8.7	31.9	33.5	46.0	12.5	100	322	
Hori.	960.525	QP	40.5	22.1	11.0	30.5	43.1	53.9	10.8	100	232	
Hori.	1920.137	PK	50.7	26.5	14.2	41.2	50.2	73.9	23.7	113	302	
Hori.	2349.986	PK	47.8	26.8	14.7	41.1	48.2	73.9	25.7	130	156	
Hori.	2483.500	PK	46.2	26.9	14.8	41.0	46.9	73.9	27.0	100	170	
Hori.	2484.050	PK	46.4	26.9	14.8	41.0	47.1	73.9	26.8	100	170	
Hori.	2609.879	PK	47.0	27.2	15.0	41.2	48.0	73.9	25.9	100	152	
Hori.	4960.000	PK	47.7	31.8	7.4	41.1	45.8	73.9	28.1	100	141	
Hori.	7440.000	PK	47.6	37.4	8.9	41.1	52.8	73.9	21.1	100	0	
Hori.	9920.000	PK	42.5	38.9	9.9	38.8	52.5	73.9	21.4	100	0	
Hori.	12400.000	PK	43.8	39.7	11.0	39.1	55.4	73.9	18.5	100	0	
Hori.	1920.137	AV	42.2	26.5	14.2	41.2	41.7	53.9	12.2	113	302	
Hori.	2349.986	AV	35.7	26.8	14.7	41.1	36.1	53.9	17.8	130	156	
Hori.	2483.500	AV	34.7	26.9	14.8	41.0	35.4	53.9	18.5	100	170	
Hori.	2484.050	AV	34.7	26.9	14.8	41.0	35.4	53.9	18.5	100	170	
Hori.	2609.879	AV	36.7	27.2	15.0	41.2	37.7	53.9	16.2	100	152	
Hori.	4960.000	AV	36.4	31.8	7.4	41.1	34.5	53.9	19.4	100	141	
Hori.	7440.000	AV	34.4	37.4	8.9	41.1	39.6	53.9	14.3	100	0	
Hori.	9920.000	AV	32.0	38.9	9.9	38.8	42.0	53.9	11.9	100	0	
Hori.	12400.000	AV	32.0	39.7	11.0	39.1	43.6	53.9	10.3	100	0	
Vert.	39.541	QP	39.8	14.7	6.5	32.2	28.8	40.0	11.2	100	60	
Vert.	47.938	QP	37.0	11.6	6.7	32.2	23.1	40.0	16.9	100	62	
Vert.	1920.141	PK	49.6	26.5	14.2	41.2	49.1	73.9	24.8	100	192	
Vert.	2349.929	PK	47.8	26.8	14.7	41.1	48.2	73.9	25.7	100	346	
Vert.	2483.500	PK	46.3	26.9	14.8	41.0	47.0	73.9	26.9	100	228	
Vert.	2484.050	PK	45.8	26.9	14.8	41.0	46.5	73.9	27.4	100	228	
Vert.	2609.959	PK	47.4	27.2	15.0	41.2	48.4	73.9	25.5	100	12	
Vert.	4960.000	PK	49.0	31.8	7.4	41.1	47.1	73.9	26.8	100	178	
Vert.	7440.000	PK	46.4	37.4	8.9	41.1	51.6	73.9	22.3	100	0	
Vert.	9920.000	PK	43.0	38.9	9.9	38.8	53.0	73.9	20.9	100	0	
Vert.	12400.000	PK	43.4	39.7	11.0	39.1	55.0	73.9	18.9	100	0	
Vert.	1920.141	AV	39.0	26.5	14.2	41.2	38.5	53.9	15.4	100	192	
Vert.	2349.929	AV	36.8	26.8	14.7	41.1	37.2	53.9	16.7	100	346	
Vert.	2483.500	AV	35.1	26.9	14.8	41.0	35.8	53.9	18.1	100	228	
Vert.	2484.050	AV	34.7	26.9	14.8	41.0	35.4	53.9	18.5	100	228	
Vert.	2609.959	AV	36.0	27.2	15.0	41.2	37.0	53.9	16.9	100	12	
Vert.	4960.000	AV	37.0	31.8	7.4	41.1	35.1	53.9	18.8	100	178	
Vert.	7440.000	AV	34.7	37.4	8.9	41.1	39.9	53.9	14.0	100	0	
Vert.	9920.000	AV	31.9	38.9	9.9	38.8	41.9	53.9	12.0	100	0	
Vert.	12400.000	AV	32.1	39.7	11.0	39.1	43.7	53.9	10.2	100	0	

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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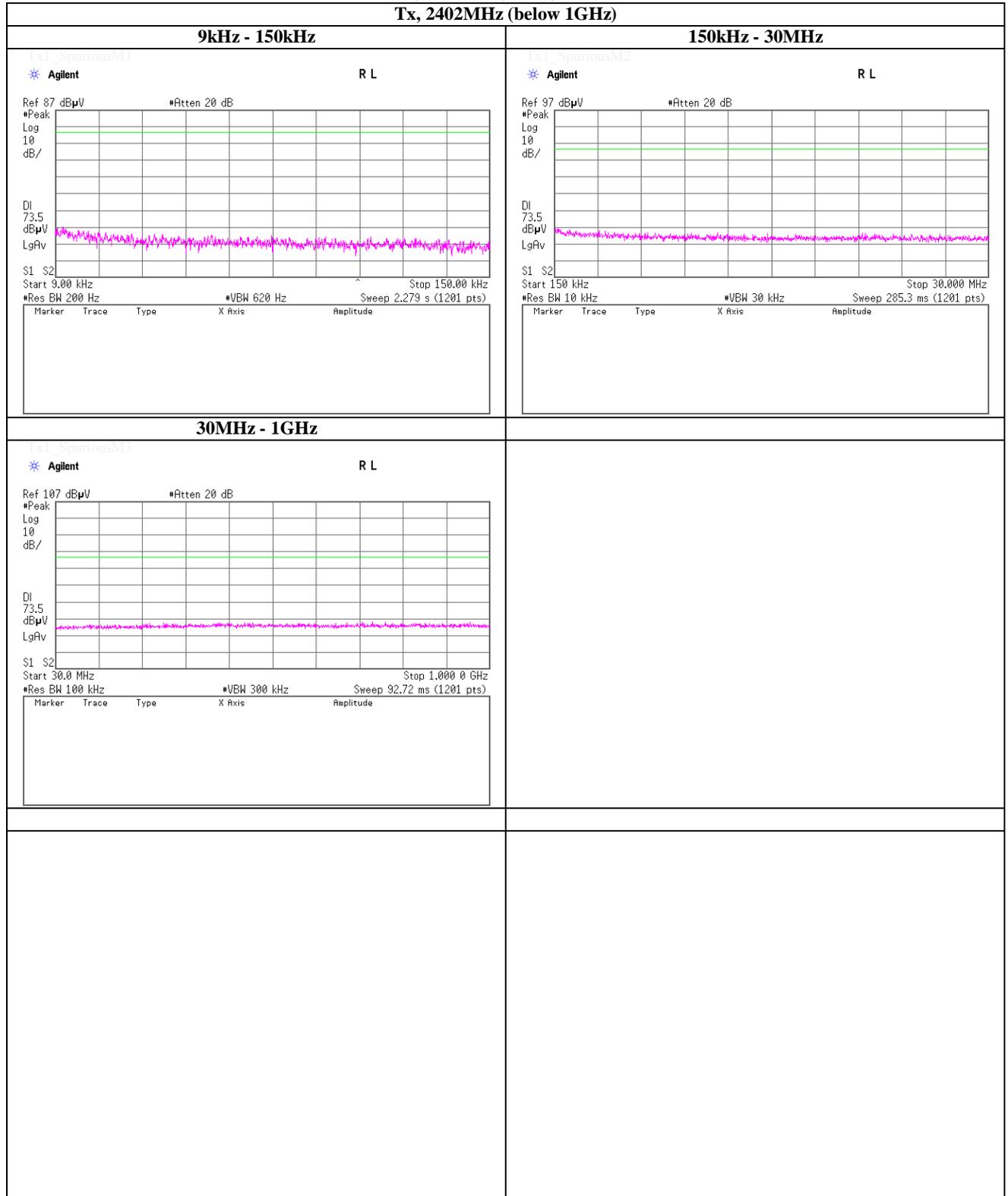
Facsimile : +81 463 50 6401

Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (below 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

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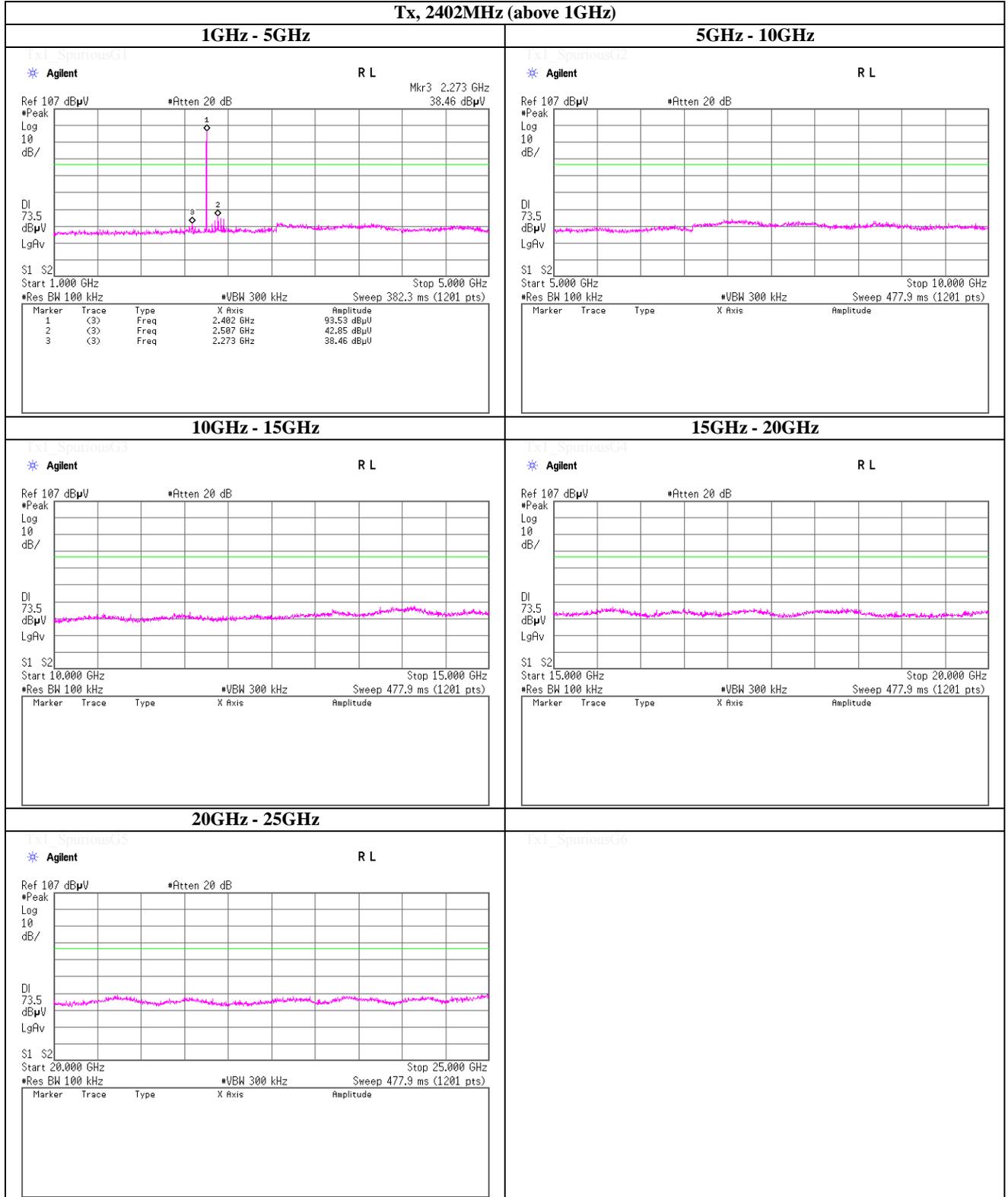
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Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (above 1GHz)



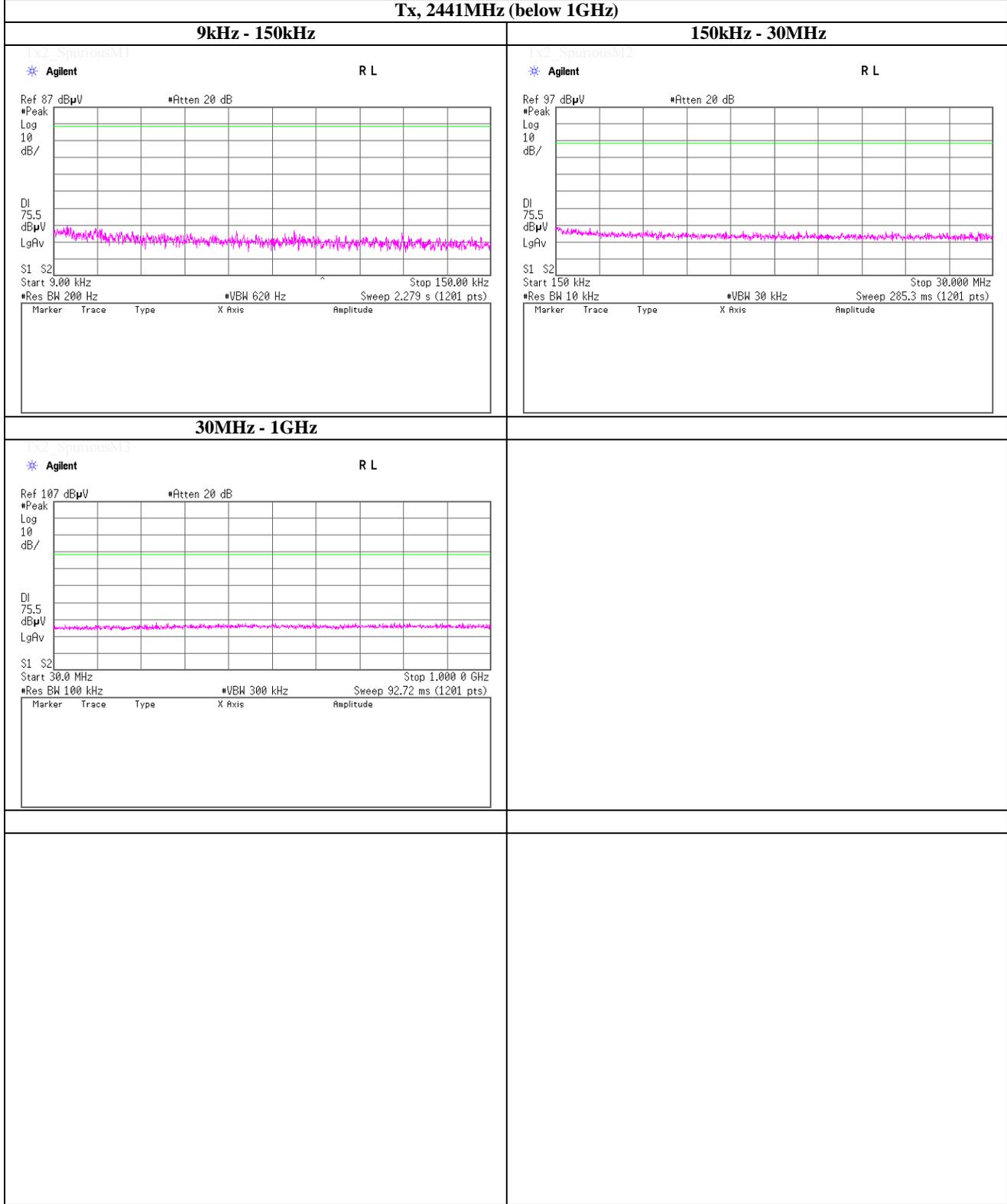
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Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
Date : December 3, 2013
Temperature/Humidity : 25deg.C, 53%RH
Engineer : Kenichi Adachi

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (below 1GHz)



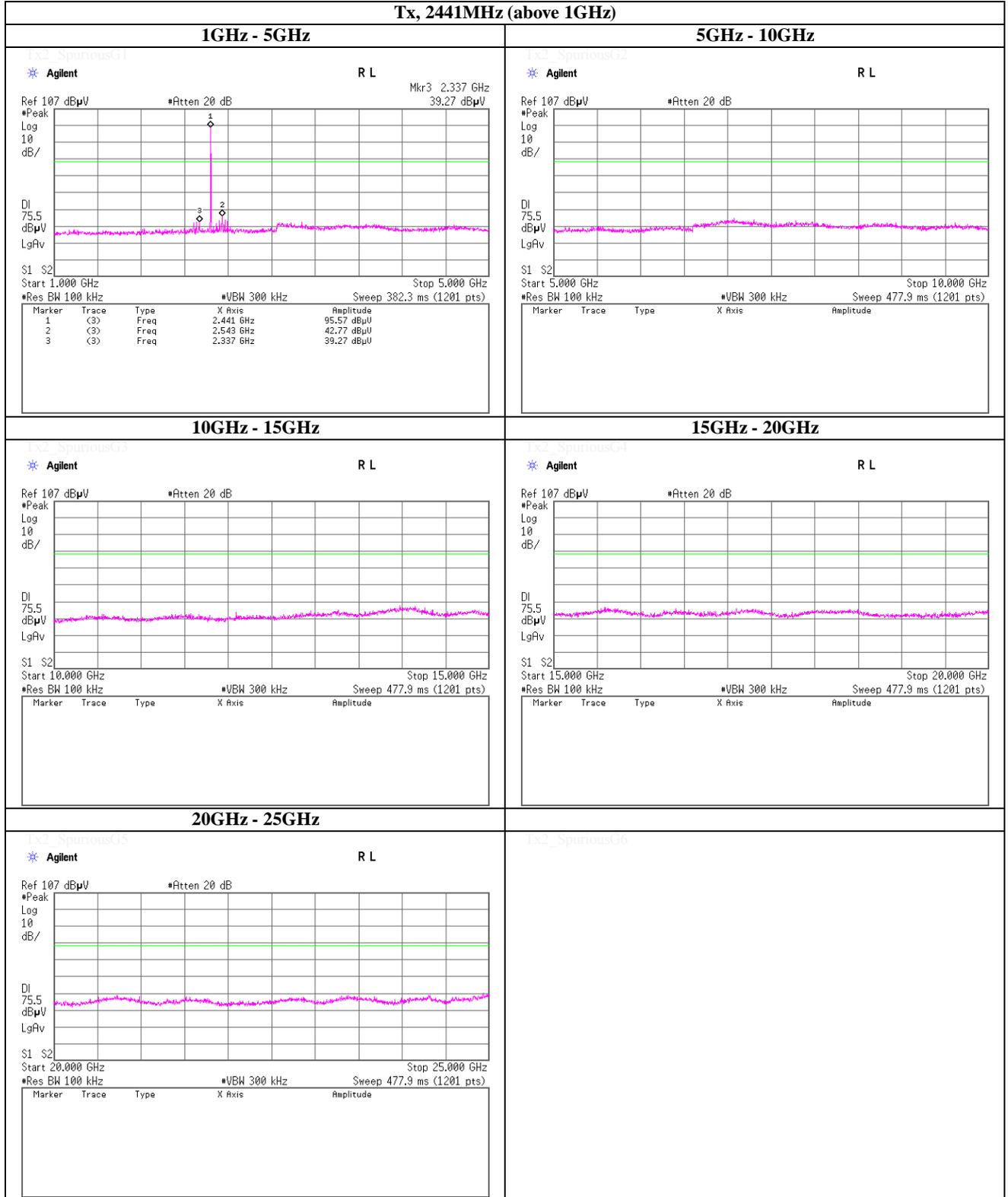
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Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
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 Engineer : Kenichi Adachi

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (above 1GHz)



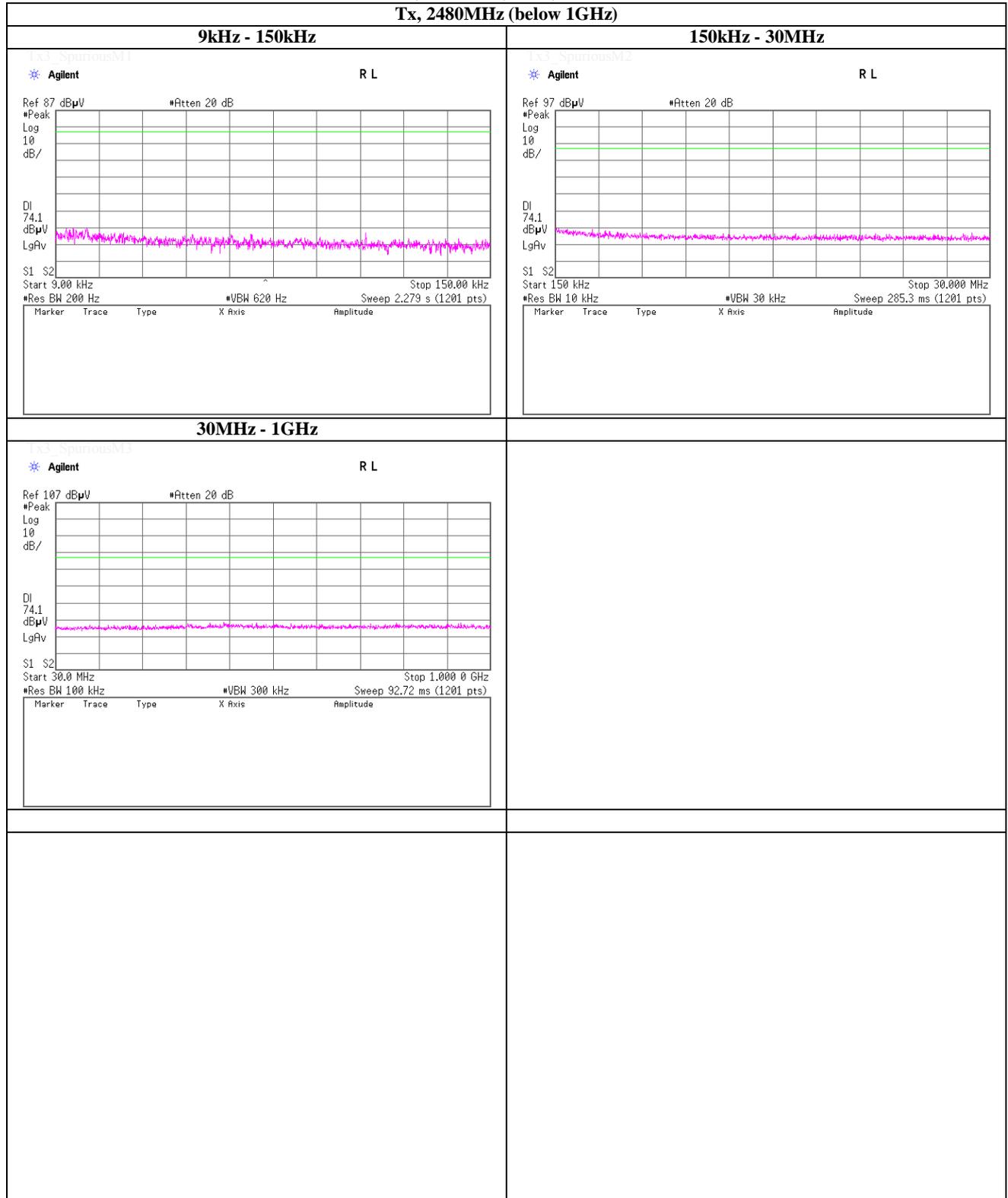
UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (below 1GHz)



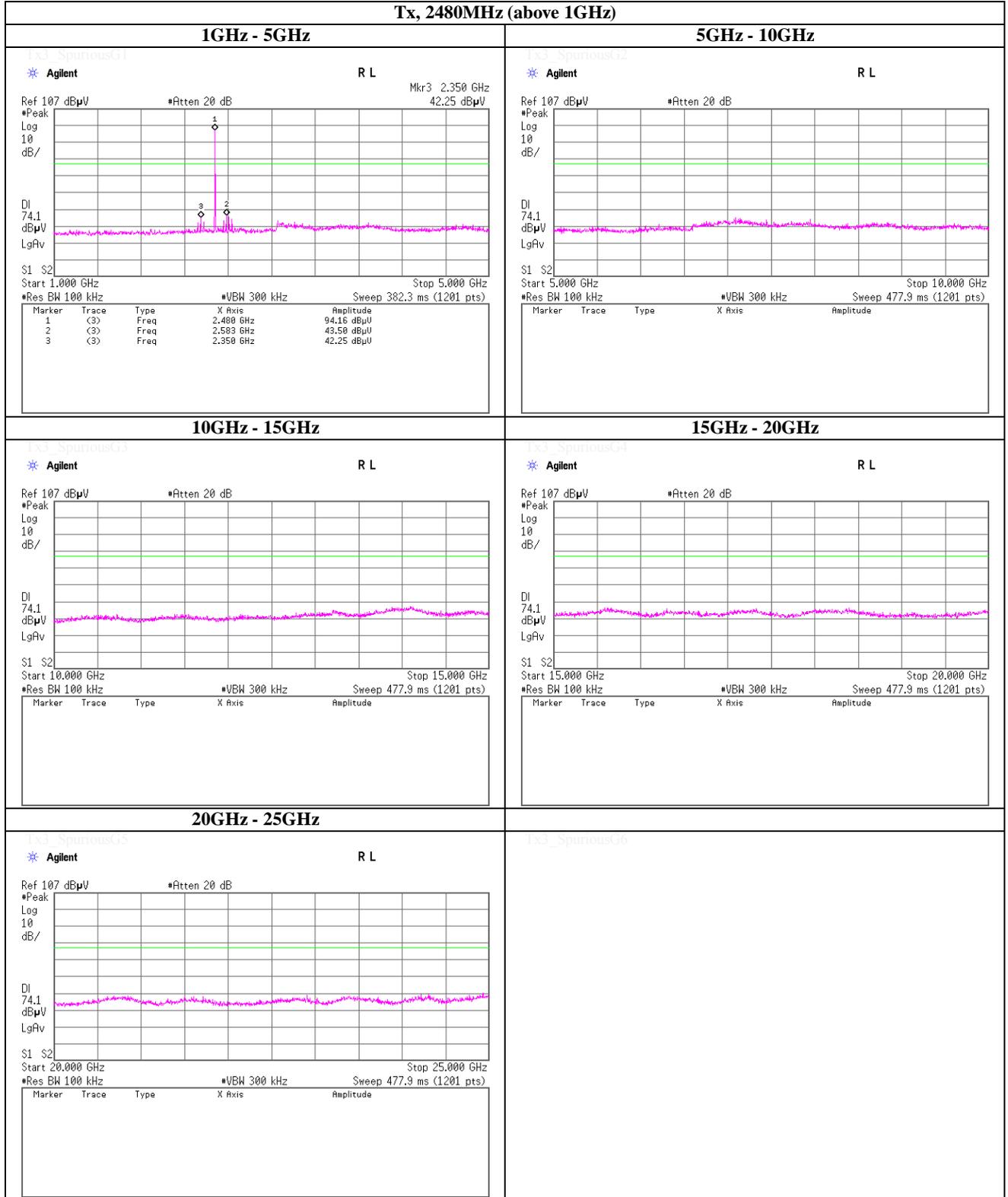
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Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (above 1GHz)

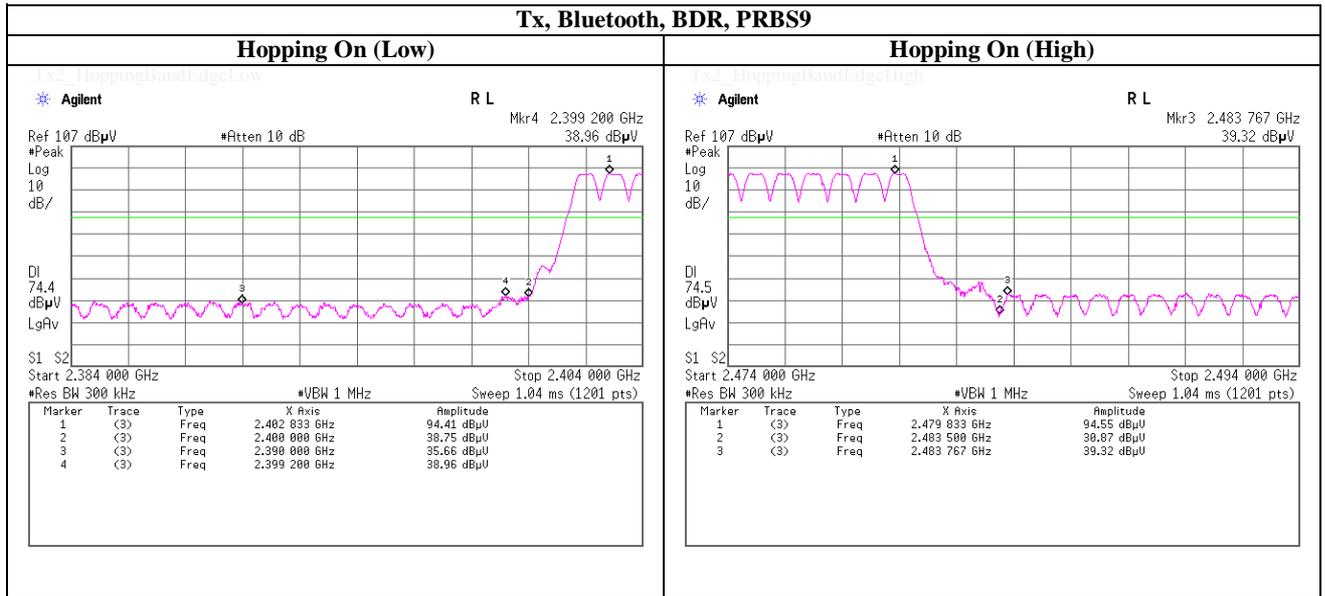
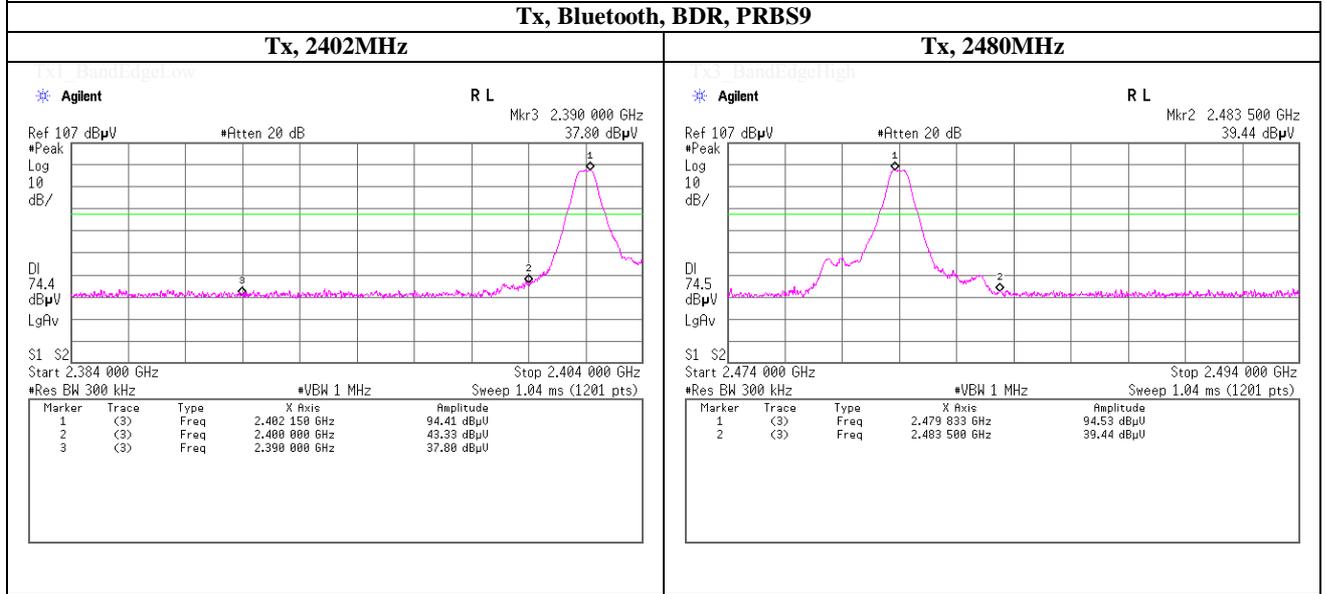


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Spurious emission (Conducted)

Band Edge compliance

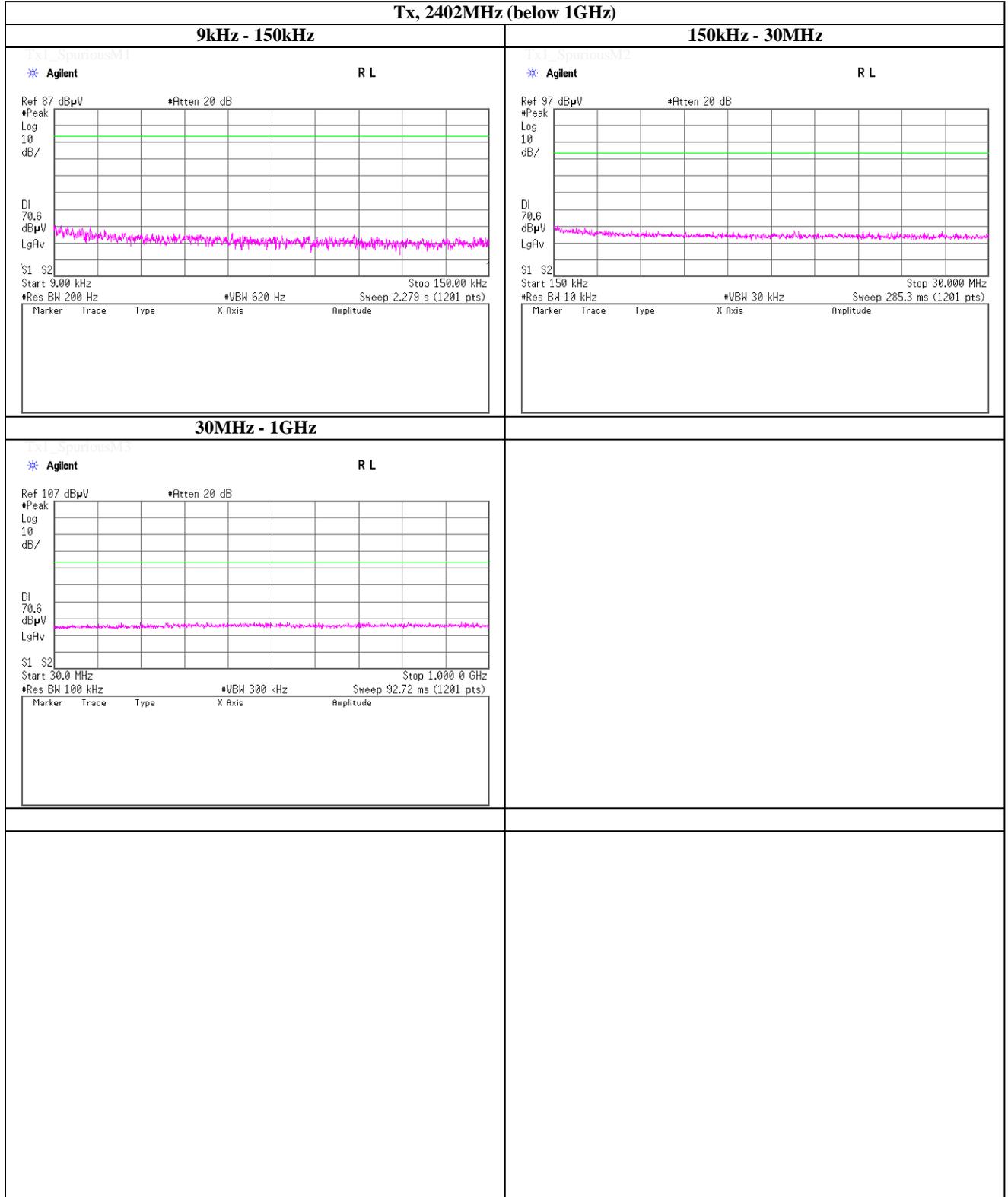


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 Engineer : Kenichi Adachi

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (below 1GHz)



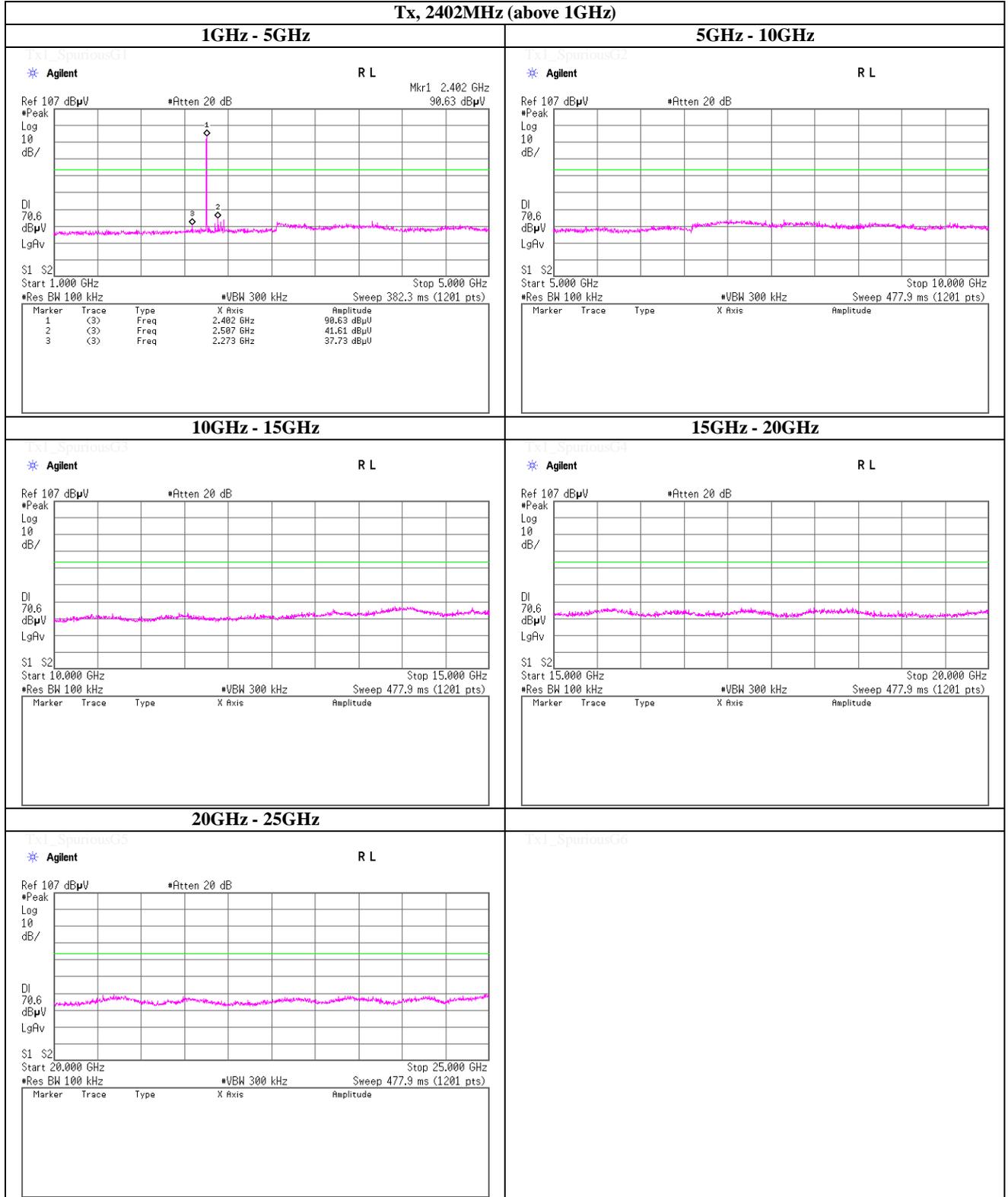
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (above 1GHz)

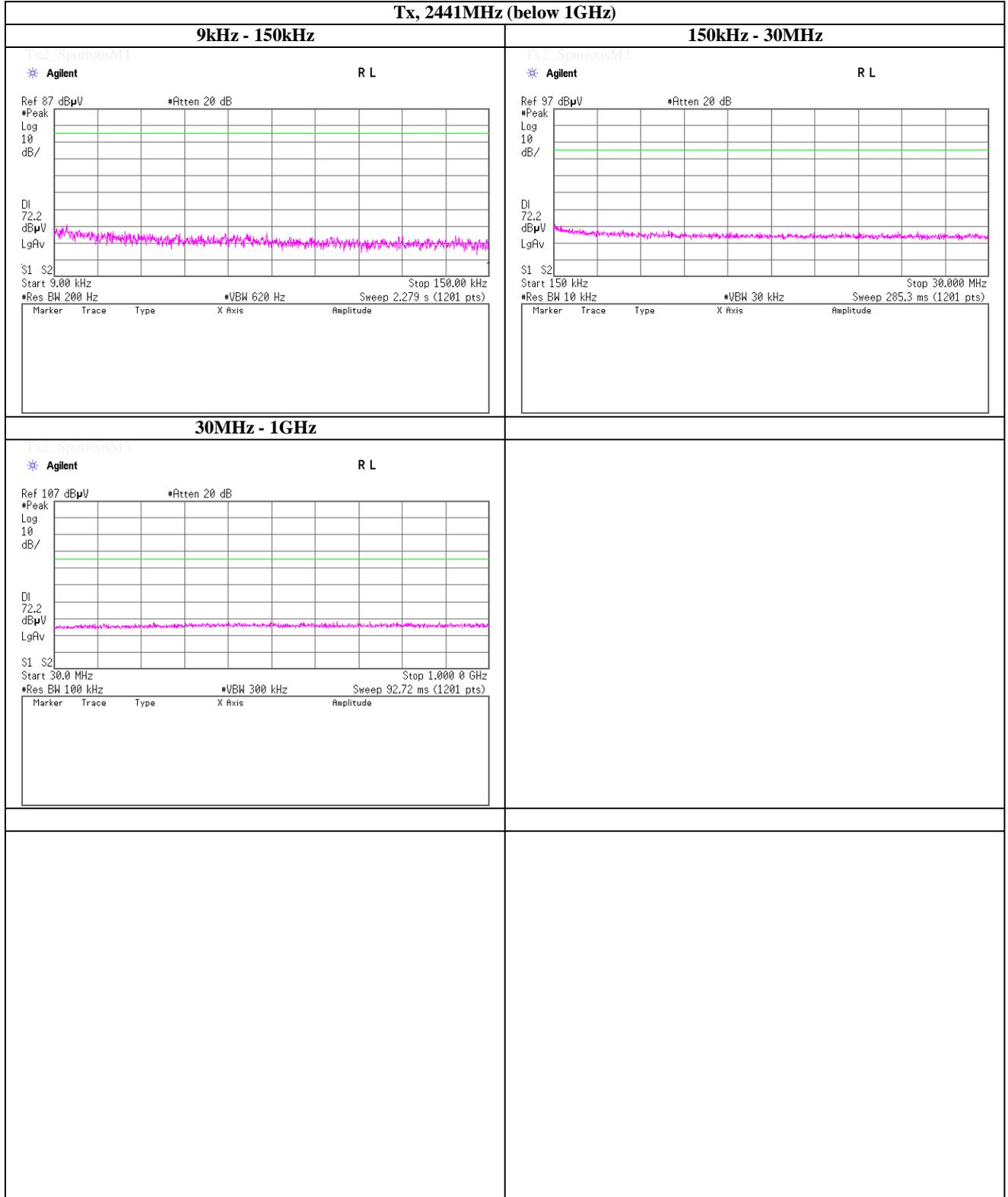


Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
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 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (below 1GHz)



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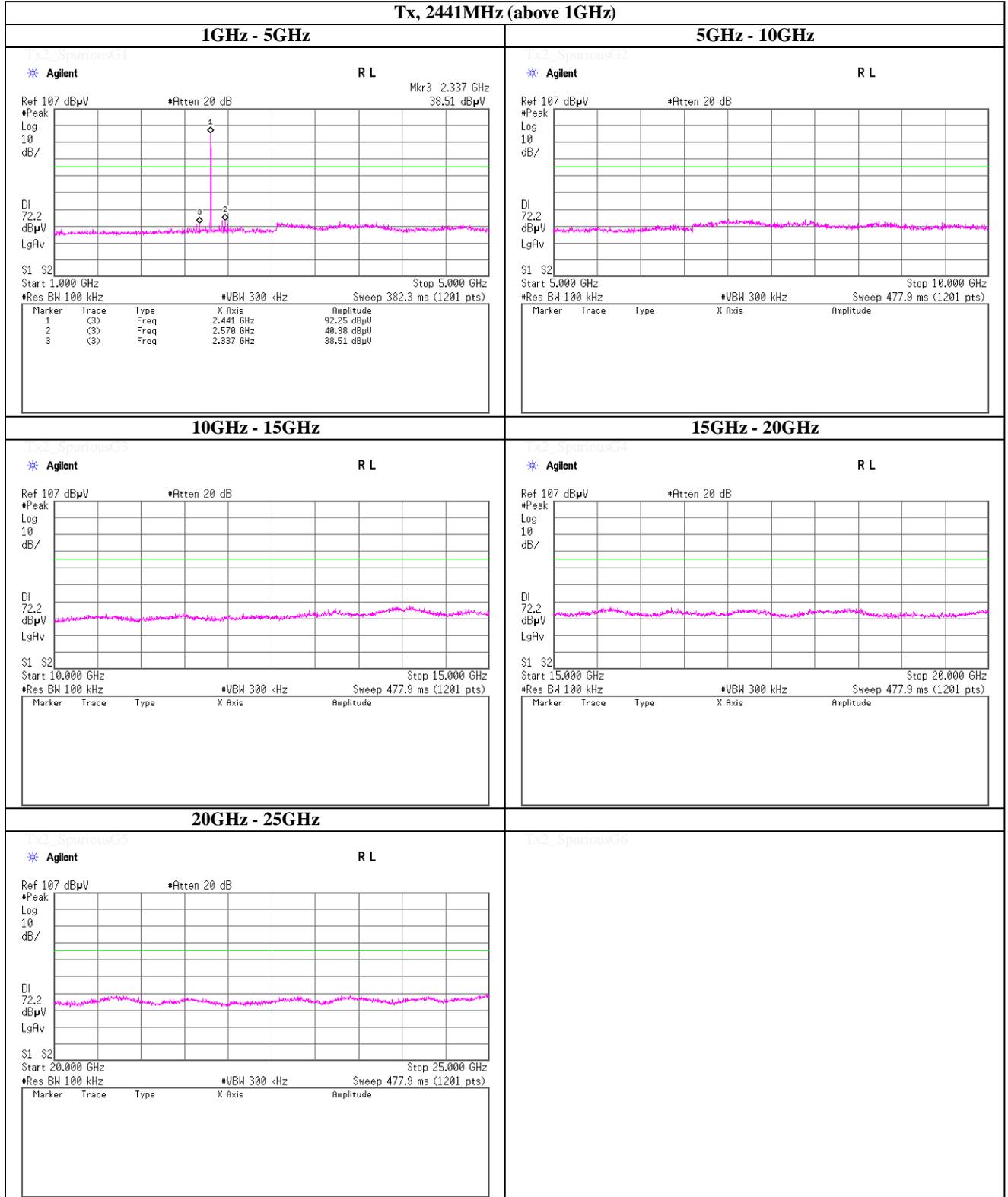
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (above 1GHz)



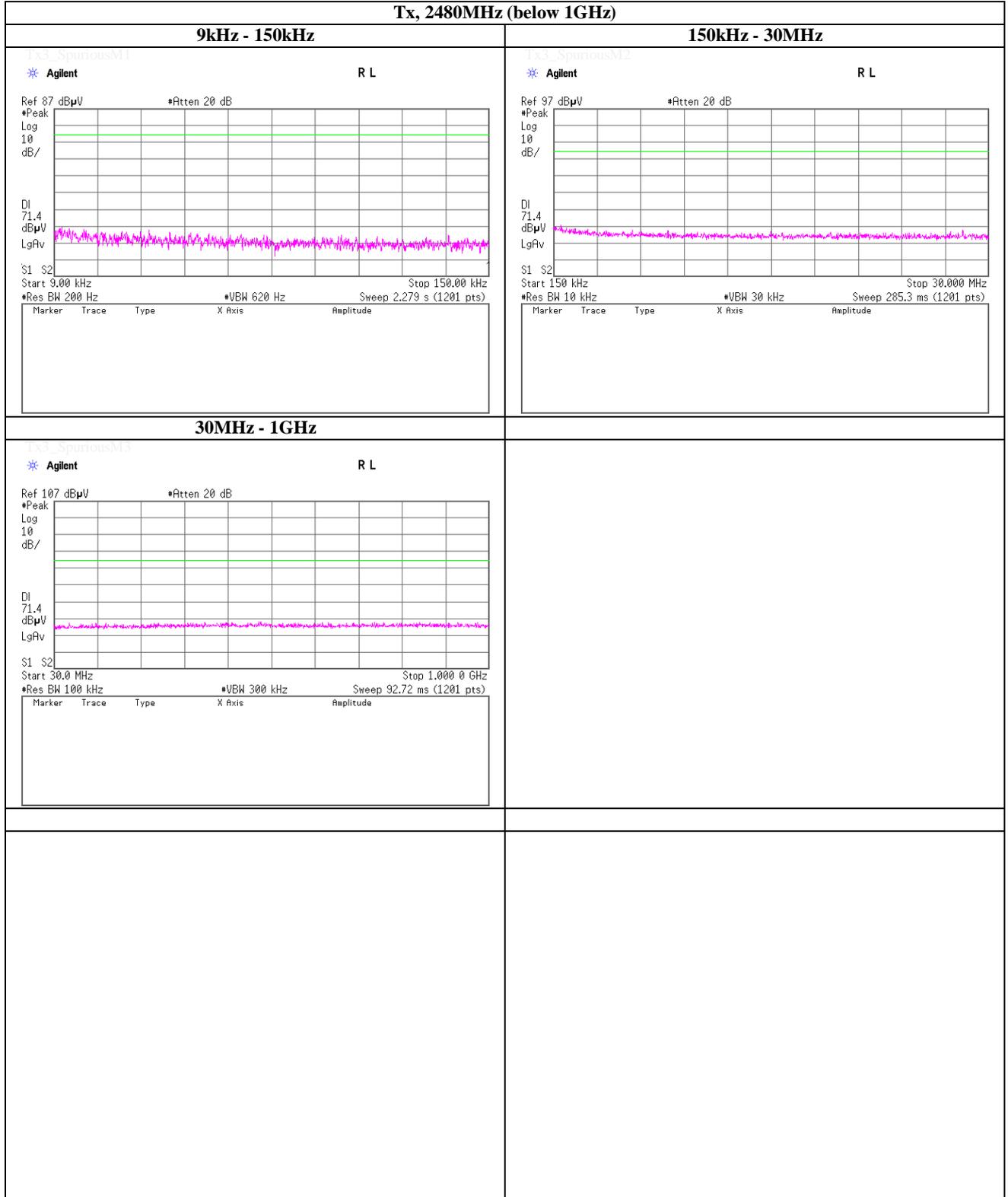
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 1GHz)



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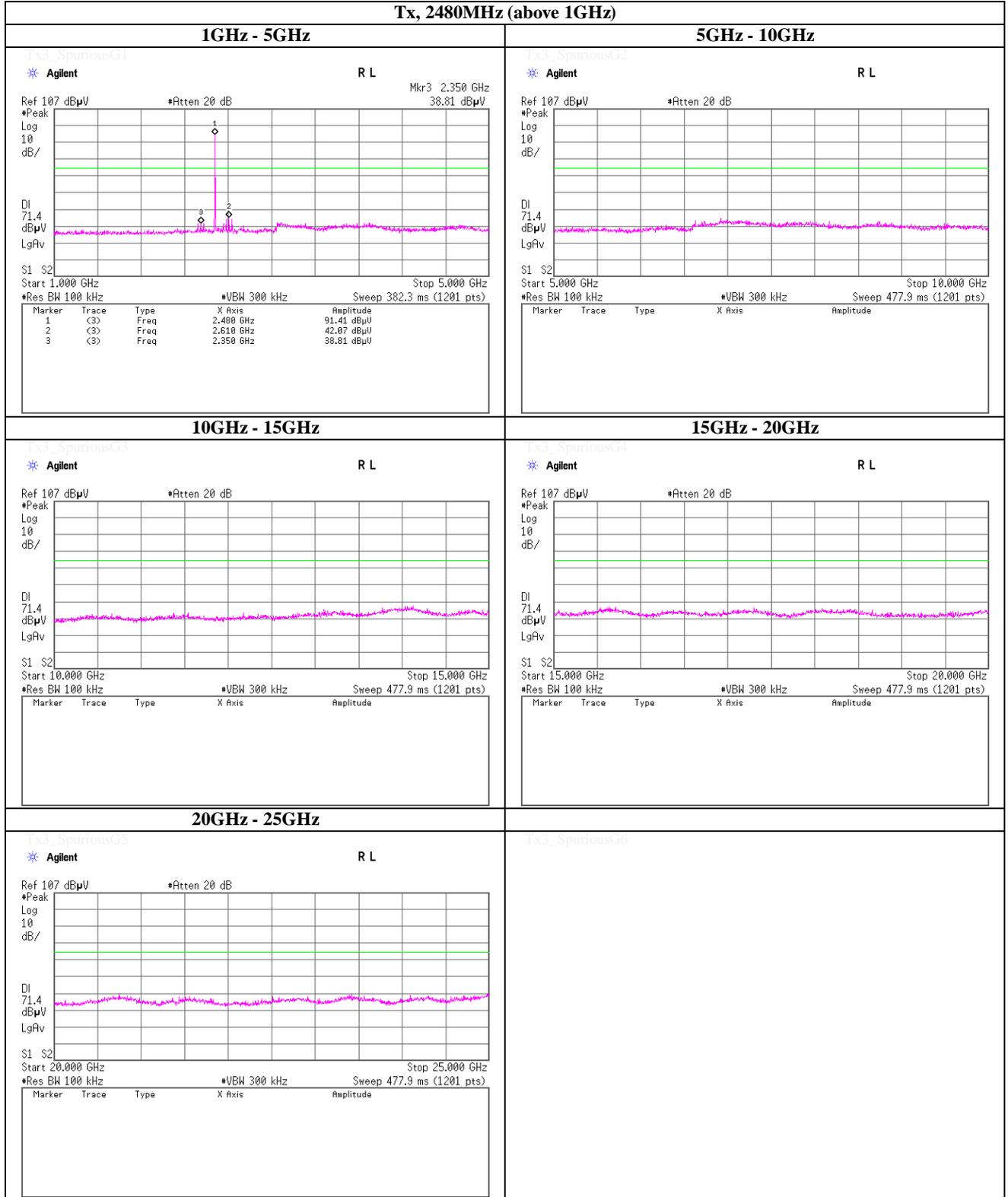
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (above 1GHz)

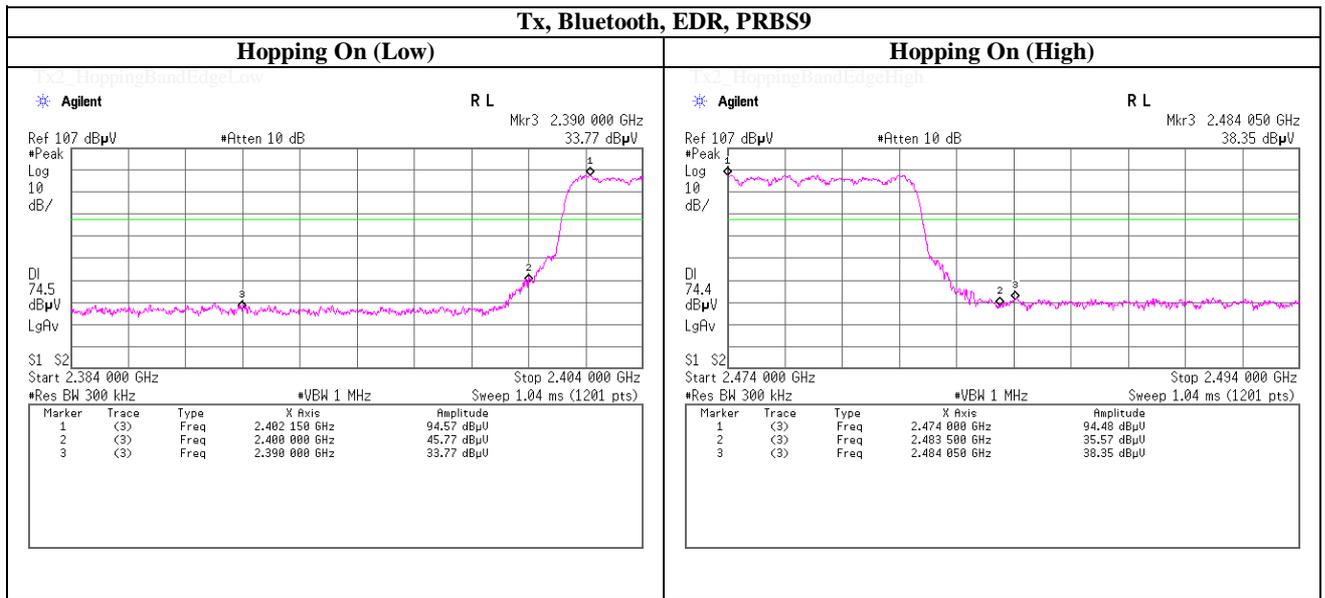
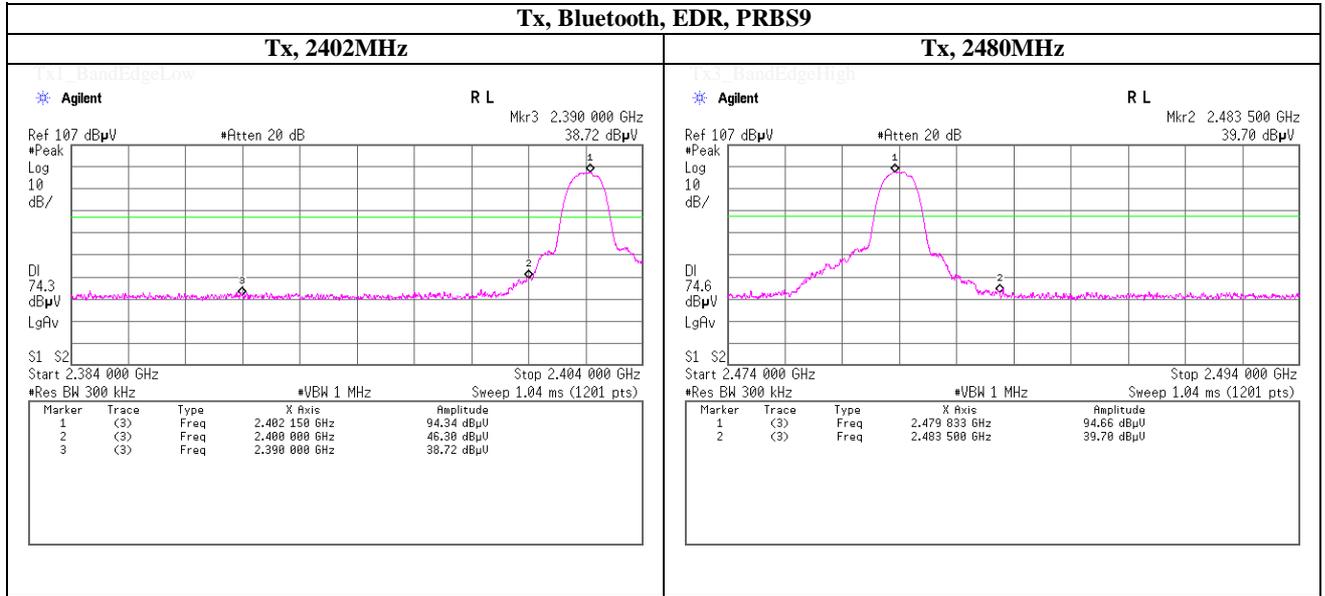


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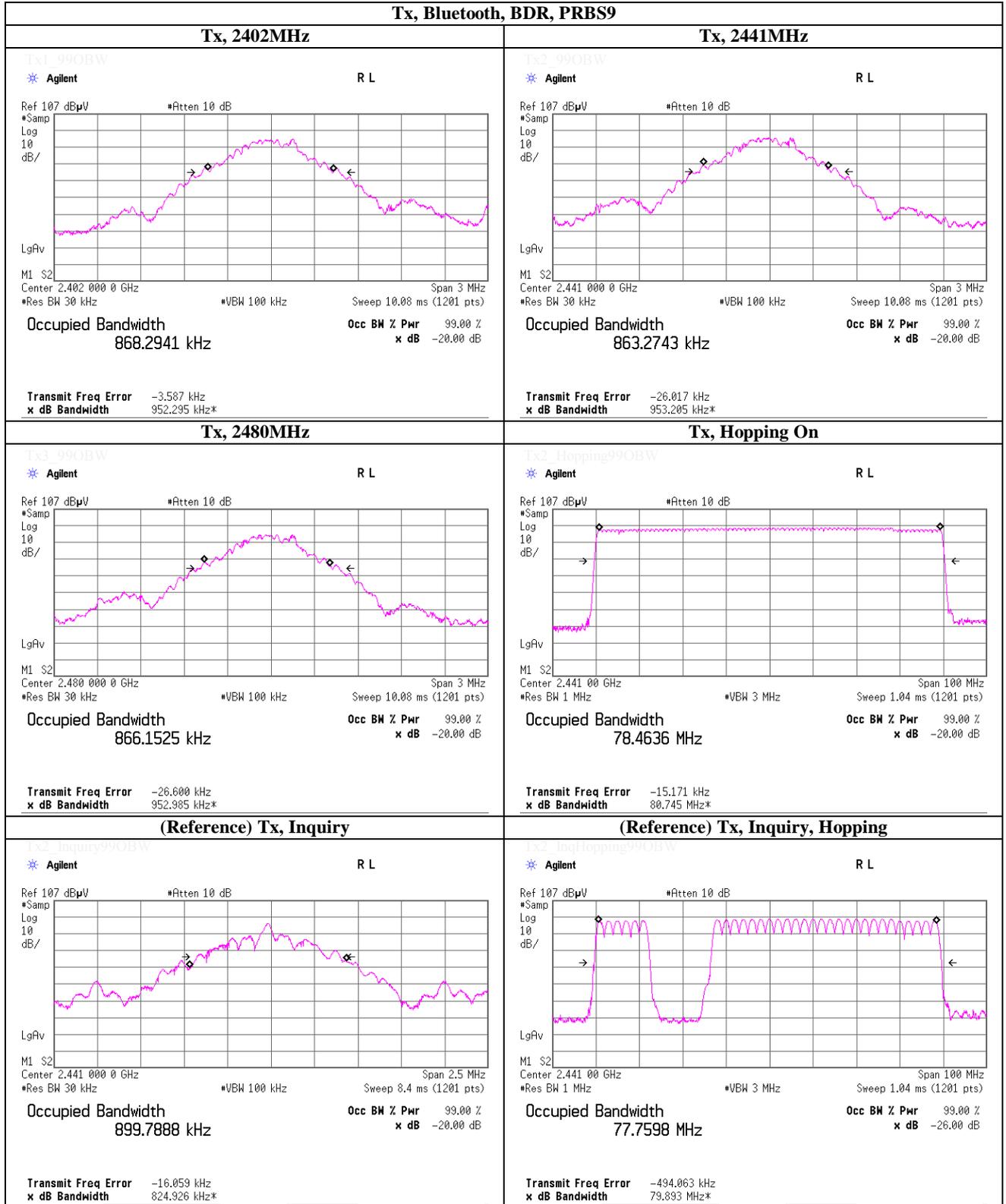
Spurious emission (Conducted)

Band Edge compliance



Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

99% Occupied Bandwidth



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Test place : UL Japan, Inc. Shonan EMC Lab. No.5 Shielded room
 Date : December 3, 2013
 Temperature/Humidity : 25deg.C, 53%RH
 Engineer : Kenichi Adachi

99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
<p style="text-align: center;">Tx, 2402MHz</p> <p style="font-size: small;">Tx1_99OBW * Agilent R L Ref 107 dBµV #Atten 10 dB #Samp Log 10 dB/ LgAv M1 S2 Center 2.402 000 0 GHz Span 3 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 10.00 ms (1201 pts)</p> <p style="text-align: center;">Occupied Bandwidth 1.1627 MHz</p> <p style="text-align: right; font-size: small;">Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p style="font-size: x-small;">Transmit Freq Error -7.073 kHz x dB Bandwidth 1.281 MHz*</p>	<p style="text-align: center;">Tx, 2441MHz</p> <p style="font-size: small;">Tx1_99OBW * Agilent R L Ref 107 dBµV #Atten 10 dB #Samp Log 10 dB/ LgAv M1 S2 Center 2.441 000 0 GHz Span 3 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 10.00 ms (1201 pts)</p> <p style="text-align: center;">Occupied Bandwidth 1.1622 MHz</p> <p style="text-align: right; font-size: small;">Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p style="font-size: x-small;">Transmit Freq Error -20.841 kHz x dB Bandwidth 1.271 MHz*</p>
<p style="text-align: center;">Tx, 2480MHz</p> <p style="font-size: small;">Tx3_99OBW * Agilent R L Ref 107 dBµV #Atten 10 dB #Samp Log 10 dB/ LgAv M1 S2 Center 2.480 000 0 GHz Span 3 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 10.00 ms (1201 pts)</p> <p style="text-align: center;">Occupied Bandwidth 1.1650 MHz</p> <p style="text-align: right; font-size: small;">Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p style="font-size: x-small;">Transmit Freq Error -21.115 kHz x dB Bandwidth 1.275 MHz*</p>	<p style="text-align: center;">Tx, Hopping On</p> <p style="font-size: small;">Tx2_Hopping99OBW * Agilent R L Ref 107 dBµV #Atten 10 dB #Samp Log 10 dB/ LgAv M1 S2 Center 2.441 00 GHz Span 100 MHz #Res BW 1 MHz #VBW 3 MHz Sweep 1.04 ms (1201 pts)</p> <p style="text-align: center;">Occupied Bandwidth 78.5561 MHz</p> <p style="text-align: right; font-size: small;">Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p style="font-size: x-small;">Transmit Freq Error -26.979 kHz x dB Bandwidth 80.956 MHz*</p>
<p style="font-size: x-small;">Tx2_Inquiry99OBW</p>	<p style="font-size: x-small;">Tx2_InqHopping99OBW</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)
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2013/04/09 * 12
SPSS-01	Power Sensor	Anritsu	MA2444D	0738366	AT	2013/04/09 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2013/01/08 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2013/04/09 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2013/03/16 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2013/03/07 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2013/07/09 * 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	2013/08/19 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2013/02/27 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2013/03/04 * 12
SJM-11	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE	-
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2013/11/22 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2013/11/22 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2013/03/14 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2013/03/19 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2013/03/16 * 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	2013/10/26 * 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	2013/10/26 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2013/02/27 * 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 tests