



RADIO TEST REPORT

Test Report No.: 10085485S-A

Applicant : Sony Corporation
Type of Equipment : Bluetooth Audio System
Model No. : MEX-N5000BT
FCC ID : AK8MEXN5000BT
Test regulation : FCC Part15 Subpart C: 2013
Test result : Complied

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3. This sample tested is in compliance with the limits of the above regulation.
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Date of test: October 24 to 25, 2013

Tested by:

T. Arai

Tatsuya Arai
Engineer of WiSE Japan,
UL Verification Service

Approved by :

T. Imamura

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-N5000BT
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 : October 11, 2013
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: MEX-N5000BT (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

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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Comparison list of similar models:

		Item Model	MEX-N5000BT	MEX-N5050BT
1	Destination		UC	E
2	Handling Country		USA	Venezuela
			Canada	Chile
				Argentine
				Nicaragua
				Costa Rica
				Uruguay
				Honduras
				Paraguay
				Singapore
				Taiwan
				Australia
				New Zealand
		Indonesia		
		Oman		
3	f cover	LW		
		MW	MW 530.000kHz ~ 1710.000kHz	MW 531.000kHz ~ 1602.000kHz
		MW	MW 530.000kHz ~ 1710.000kHz	MW 531.000kHz ~ 1602.000kHz
		SW	-	-
		SW	-	-
		FM	FM 87.500MHz ~ 107.900MHz	FM 87.500MHz ~ 108.000MHz
		FM	FM 87.500MHz ~ 107.900MHz	FM 87.500MHz ~ 108.000MHz
FM	FM 87.500MHz ~ 107.900MHz	FM 87.500MHz ~ 108.000MHz		
4	IF Band Change	9kHz/10kHz	-	X
5	Sirius (Satellite)		X	-

X: Applicable, -: None

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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 revision on September 30, 2013 does not affect the test specification applied to the EUT.

The EUT has been tested for compliance with FCC Part 15 Subpart B. Refer to the test report 10085485S-C.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results	
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	-	-	
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A	*See data.	Complied	
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A		-	
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied	
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied	
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (b)(1)	Conducted	N/A		Complied	
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (d) 15.209	Conducted/ Radiated	N/A		10.5dB Freq.: 2483.500 MHz Polarization: Vertical Detection: Average Mode: Tx 2480MHz, 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*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 checked="" 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 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 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 checked="" 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.

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: 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

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

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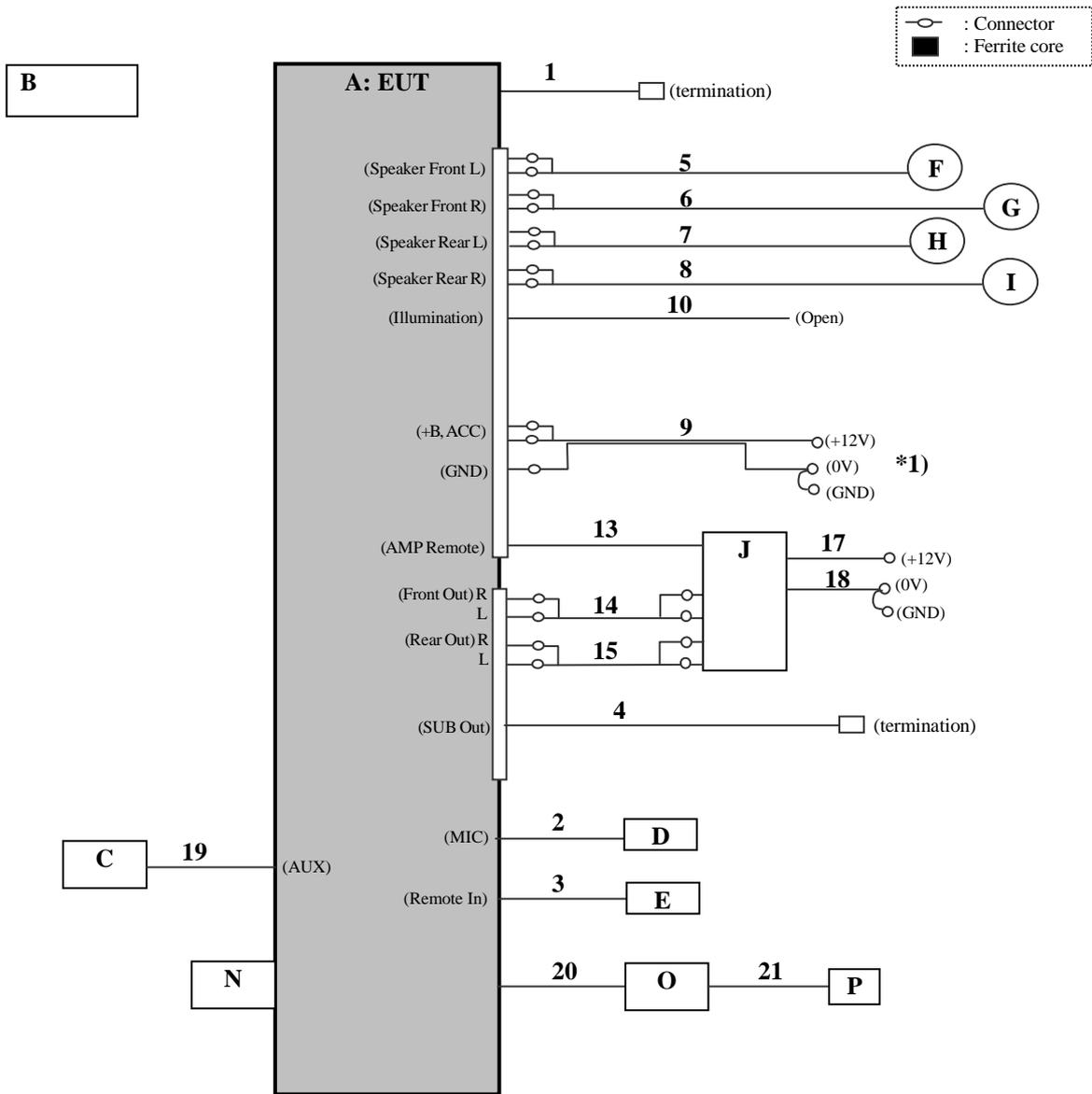
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4.2 Configuration and peripherals



* 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-N5000BT	*2)	Sony	EUT
B	Remote Commander	RM-X231	-	Sony	-
C	Media Player	NWZ-A829	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	-
N	USB Memory	USM4GL	-	Sony	-
O	Sirius XM tuner	SXV100	REG004RR	Sirius	-
P	Antenna for Sirius XM tuner	XVANT1	1046	Sirius	-

*2) 80: Antenna terminal conducted tests, 81: 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+1.0	Unshielded	Unshielded	-
10	Illumination	0.15+1.9	Unshielded	Unshielded	-
13	AMP Remote	0.15+1.6	Unshielded	Unshielded	-
14	RCA (Front Audio Out)	0.1+5.0	Shielded	Shielded	-
15	RCA (Rear Audio Out)	0.1+5.0	Shielded	Shielded	-
17	DC Power (+)	1.0	Unshielded	Unshielded	-
18	DC Power (-)	1.0	Unshielded	Unshielded	-
19	Audio	1.5	Shielded	Shielded	-
20	XM tuner	0.6	Shielded	Shielded	-
21	Antenna	7.0	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		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 0 to +45 deg (lengthwise direction) and -45 to +45 deg (crosswise direction) 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	Lengthwise	0 deg.	0 deg.	0 deg.	0 deg.
	Crosswise	0 deg.	0 deg.	0 deg.	0 deg.
Vertical	Lengthwise	0 deg.	0 deg.	0 deg.	0 deg.
	Crosswise	0 deg.	0 deg.	0 deg.	0 deg.

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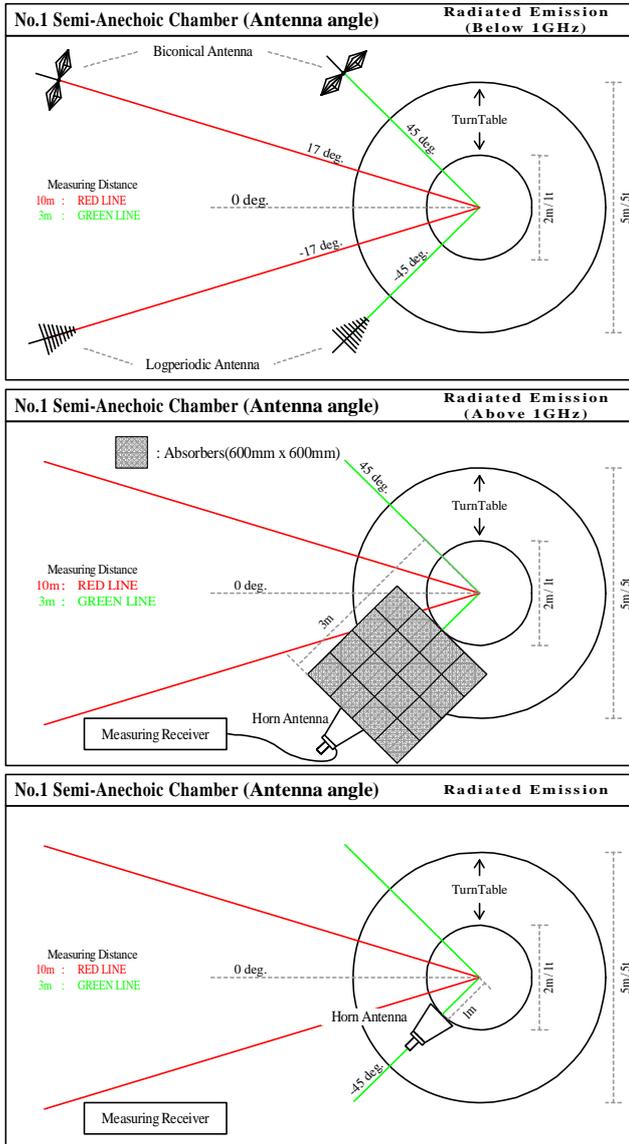
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Figure 1. Antenna angle



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 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

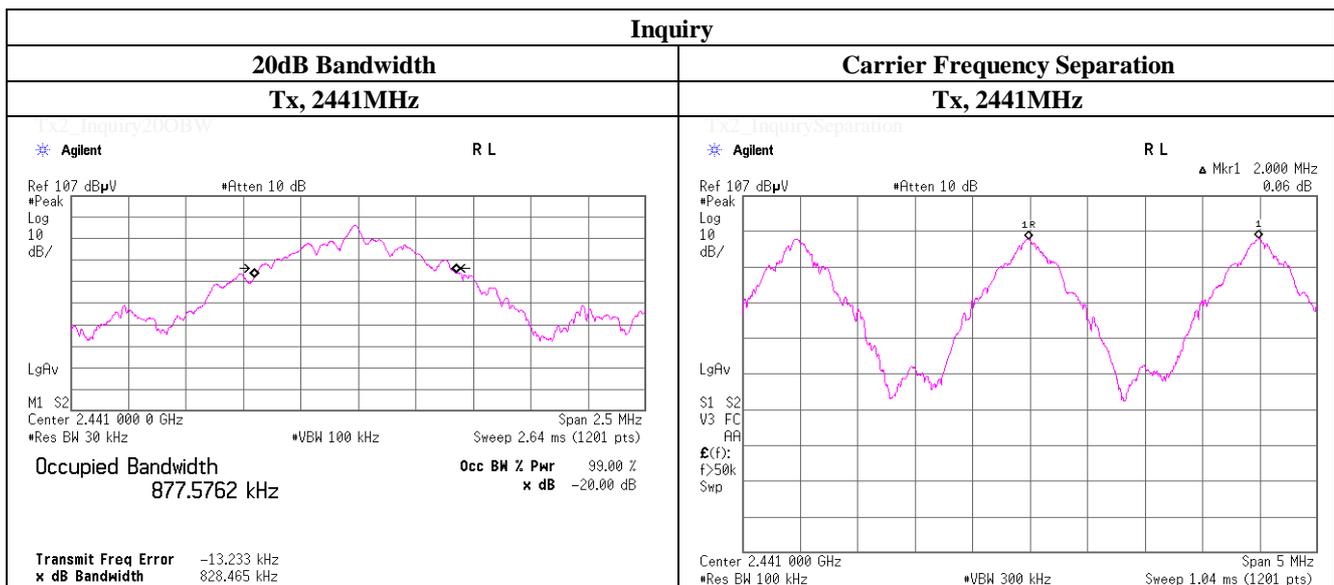
20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 24, 2013	
Temperature / Humidity	26 deg.C , 40 %RH	
Engineer	Tatsuya Arai	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.961	1.000	>= 0.641
DH5	2441.0	1.025	1.000	>= 0.683
DH5	2480.0	0.961	1.000	>= 0.641
Inquiry	2441.0	0.828	2.000	>= 0.552

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

No limit applies to 20dB Bandwidth.



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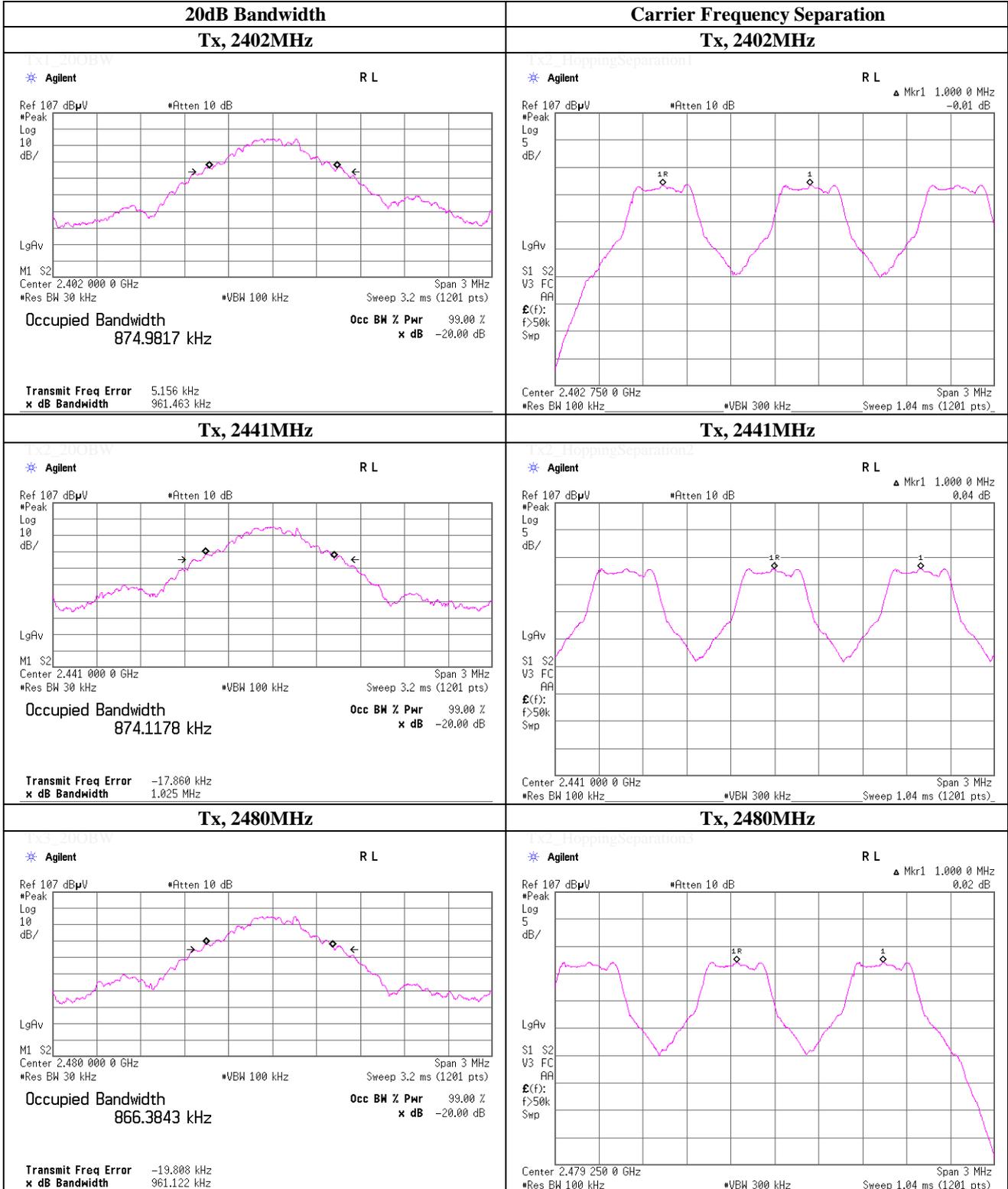
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9



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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date October 24, 2013
 Temperature / Humidity 26 deg.C , 40 %RH
 Engineer Tatsuya Arai
 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	1.285	1.000	>= 0.857
3-DH5	2441.0	1.286	1.000	>= 0.857
3-DH5	2480.0	1.277	1.000	>= 0.852

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

No limit applies to 20dB Bandwidth.

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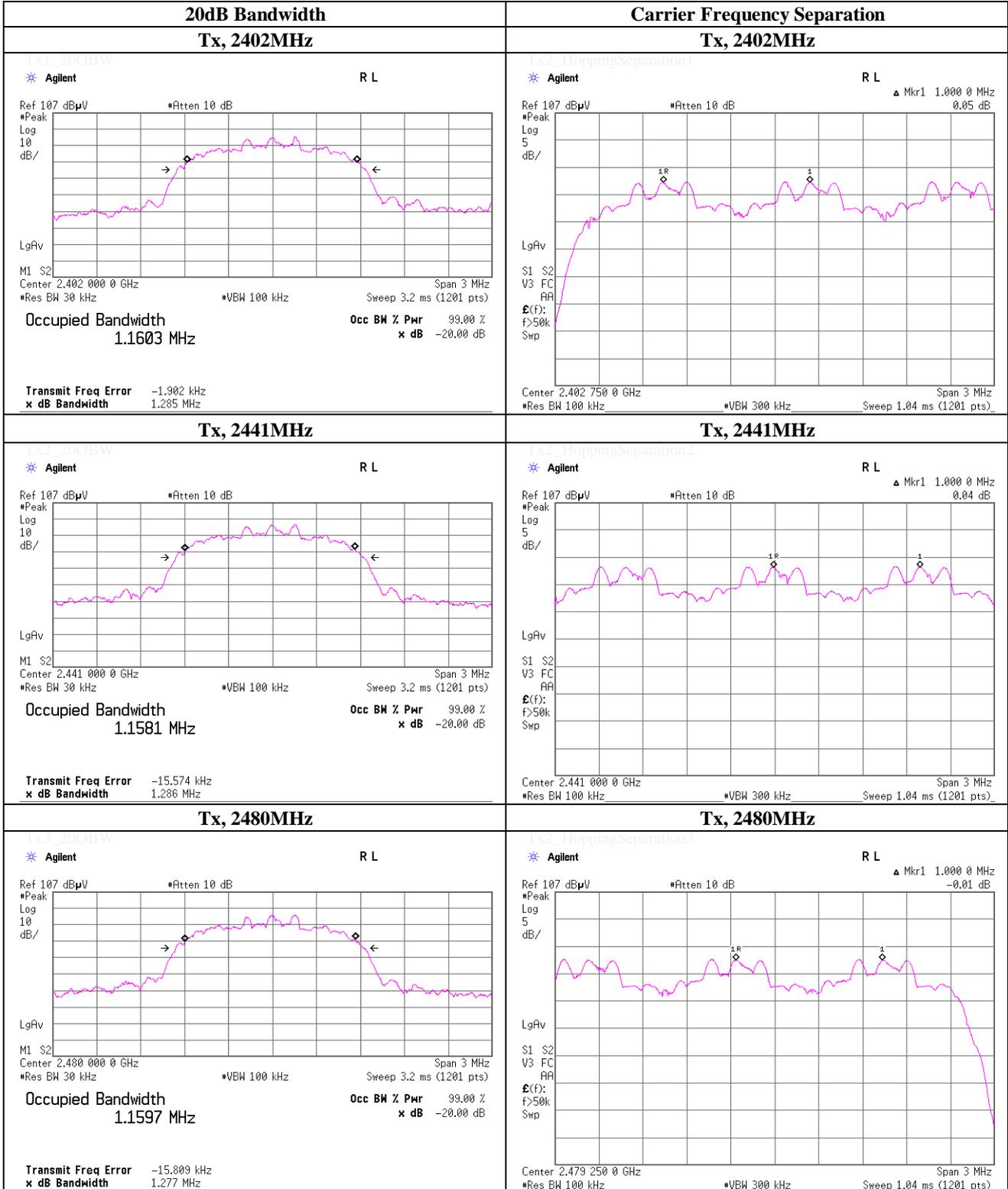
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



UL Japan, Inc.

Shonan EMC Lab.

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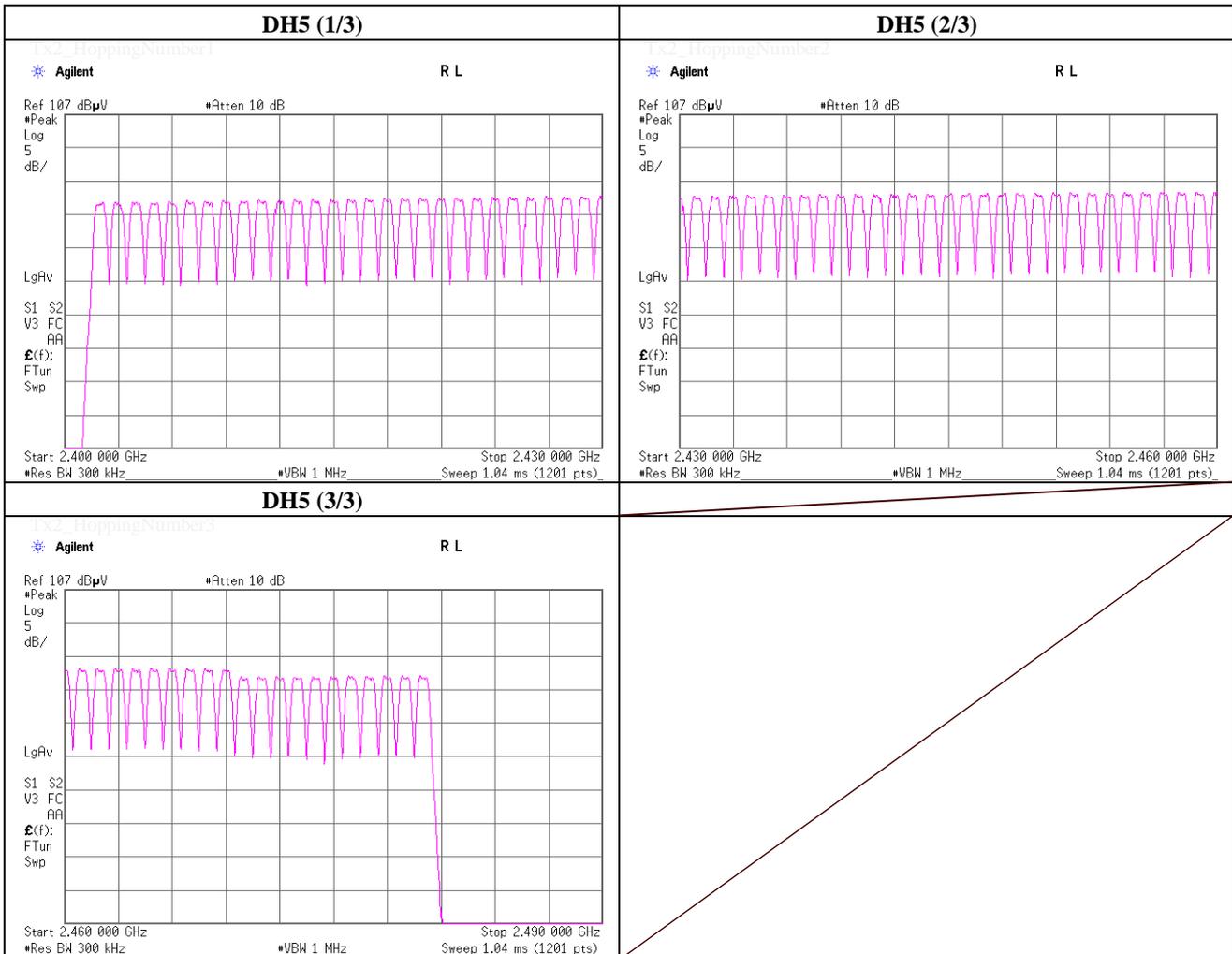
Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 24, 2013	
Temperature / Humidity	26 deg.C , 40 %RH	
Engineer	Tatsuya Arai	
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.

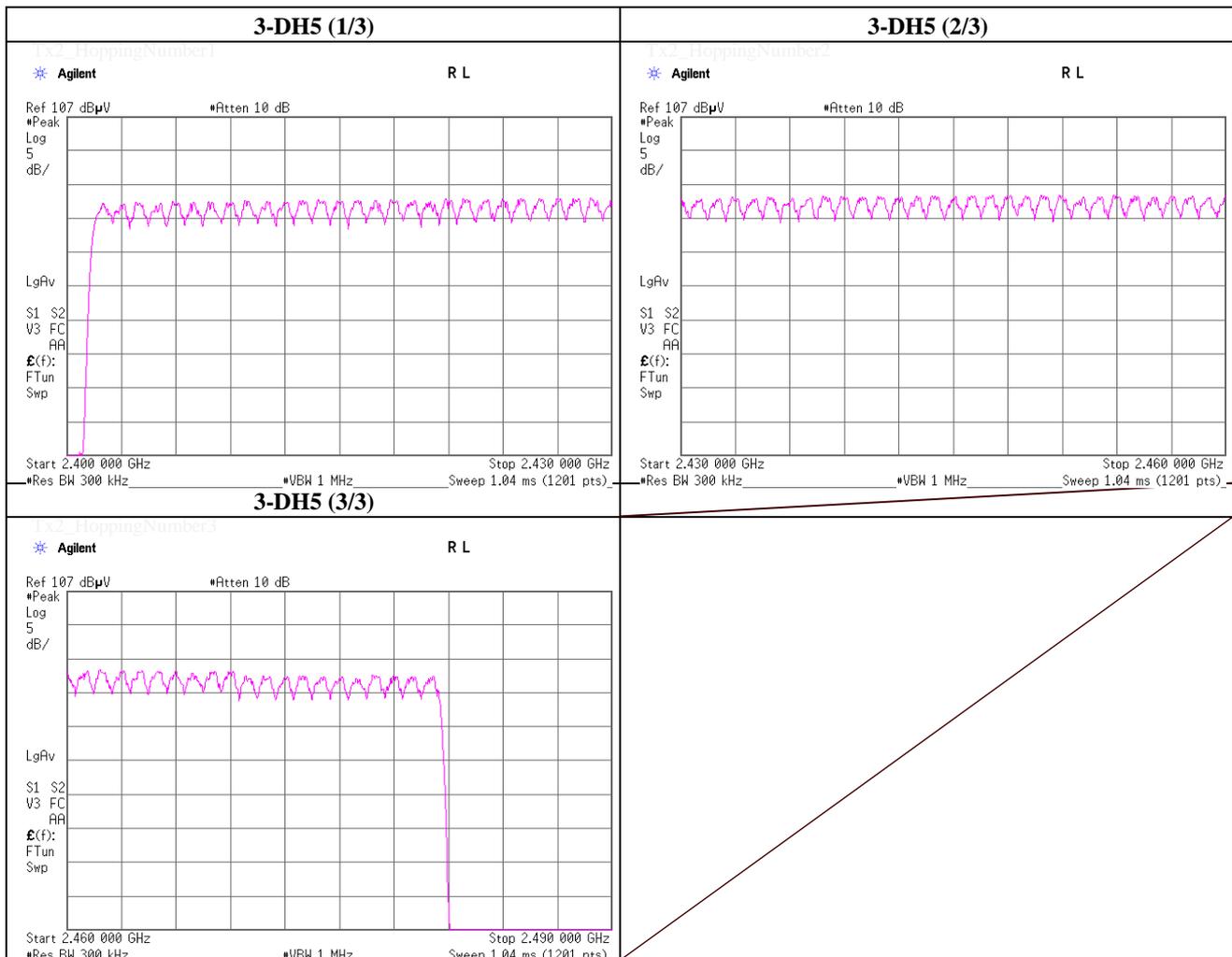


Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 24, 2013	
Temperature / Humidity	26 deg.C , 40 %RH	
Engineer	Tatsuya Arai	
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.



UL Japan, Inc.

Shonan EMC Lab.

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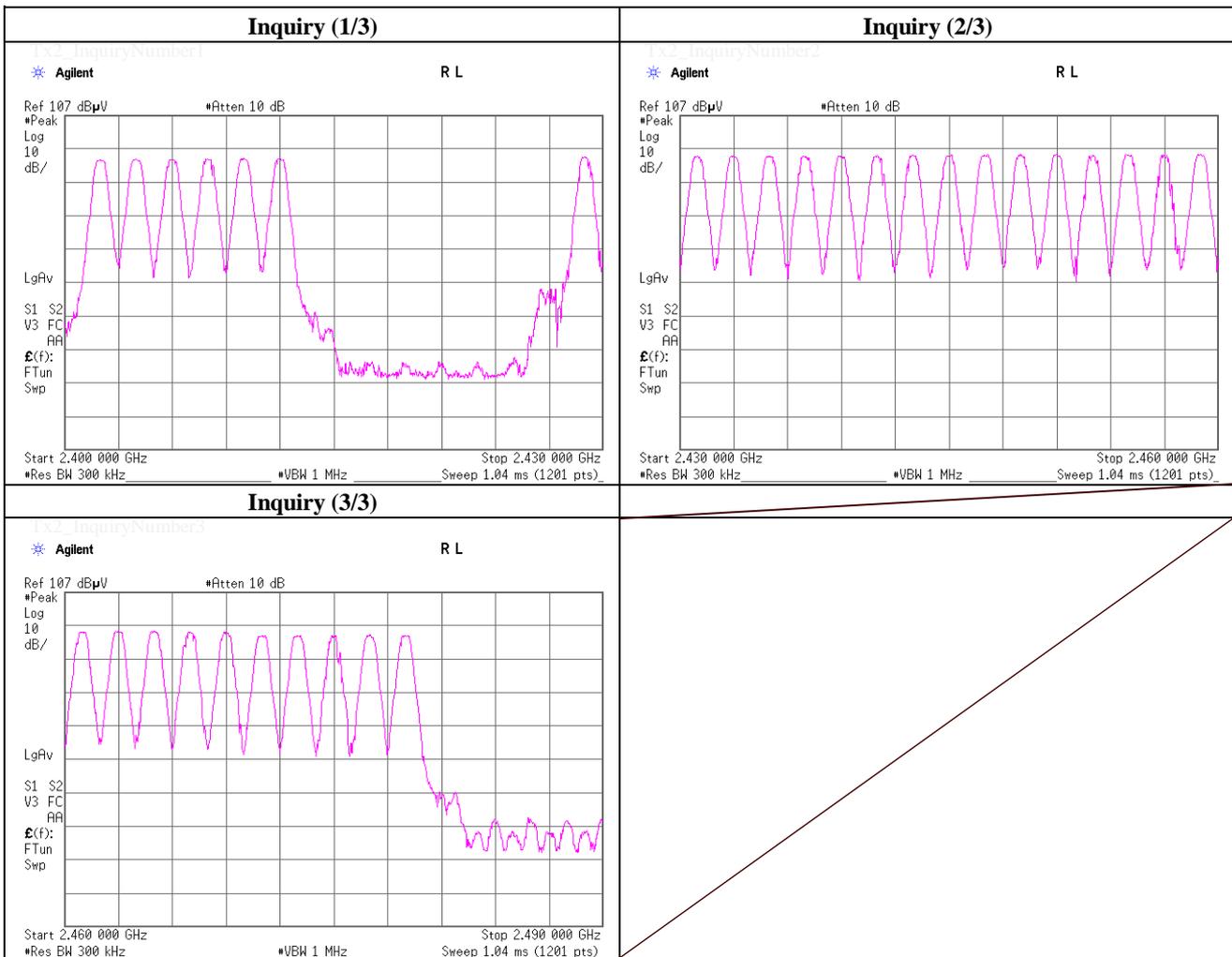
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 24, 2013	
Temperature / Humidity	26 deg.C , 40 %RH	
Engineer	Tatsuya Arai	
Mode	Tx, Bluetooth, Inquiry	

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



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Dwell Time

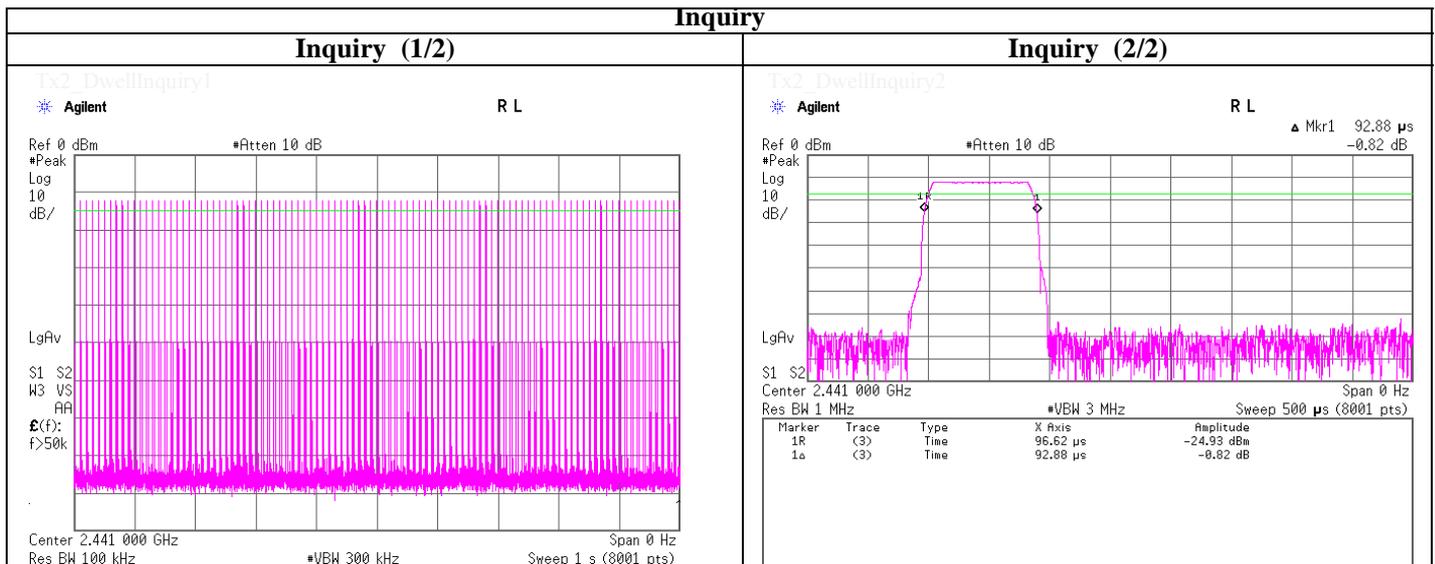
Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 24, 2013	
Temperature / Humidity	26 deg.C , 40 %RH	
Engineer	Tatsuya Arai	
Mode	Tx, Bluetooth, BDR, PRBS9	

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	0.386	125	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.641	271	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.890	312	400
Inquiry	100.0 / 1.0 sec. x 12.8 sec. = 1280 times	0.093	119	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.

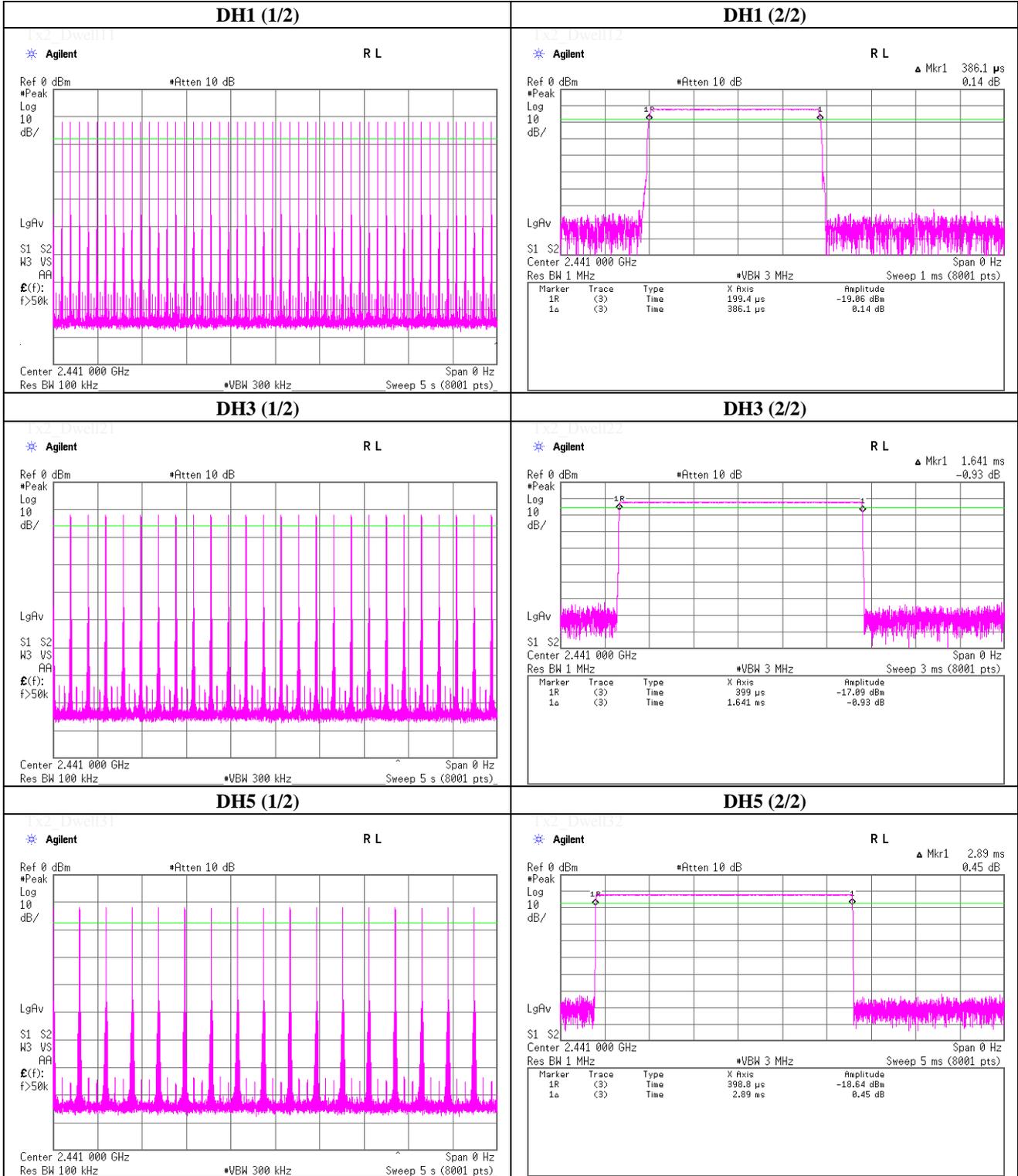
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Dwell time

Tx, Bluetooth, BDR, PRBS9



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date October 24, 2013
 Temperature / Humidity 26 deg.C , 40 %RH
 Engineer Tatsuya Arai
 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	0.401	129	400
3-DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.649	272	400
3-DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.902	313	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 $N=79$.

UL Japan, Inc.

Shonan EMC Lab.

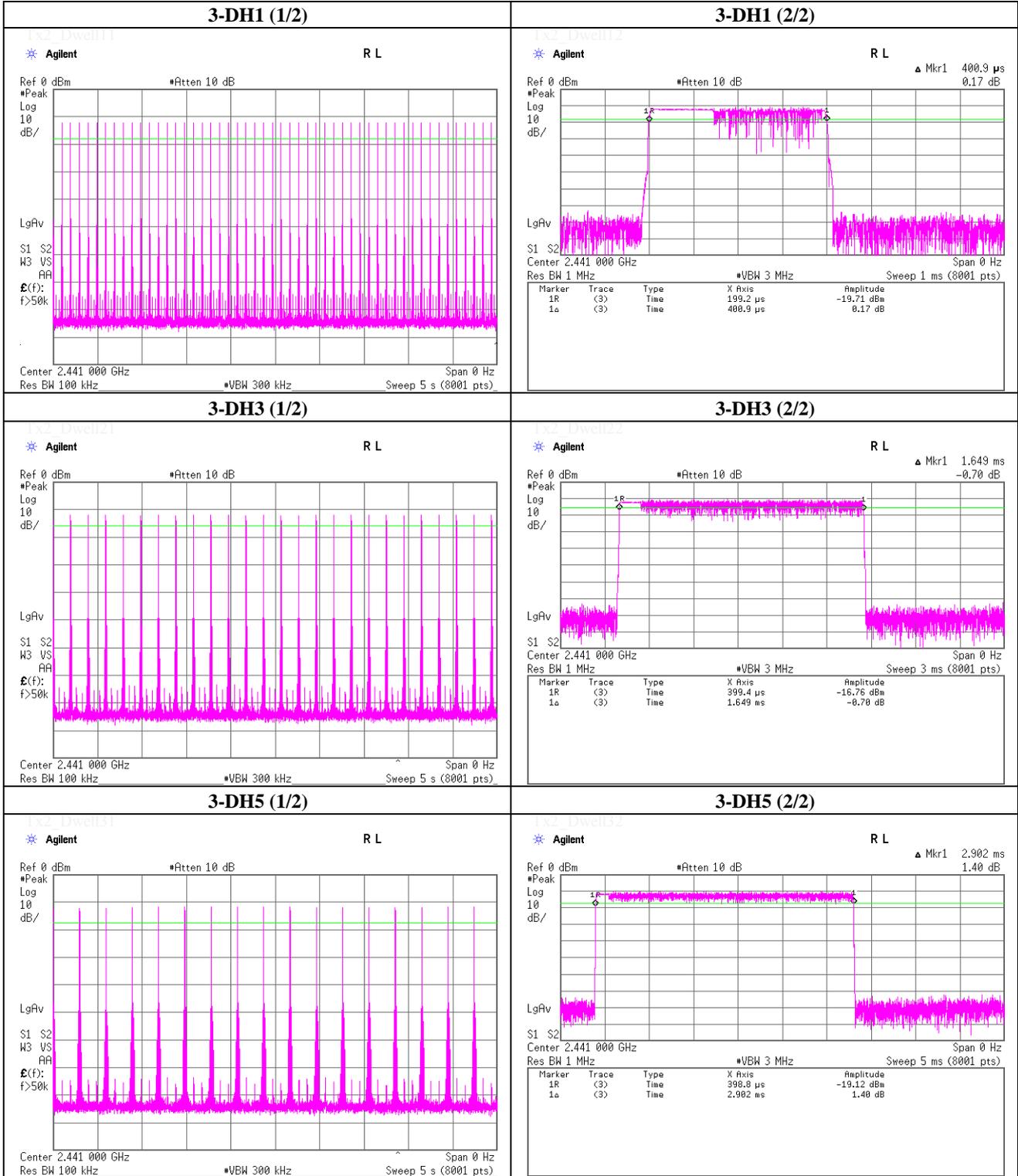
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Dwell time

Tx, Bluetooth, EDR, PRBS9



UL Japan, Inc.

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Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Maximum Peak Conducted Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
 Date October 24, 2013
 Temperature / Humidity 26 deg.C , 40 %RH
 Engineer Tatsuya Arai
 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	-12.52	1.18	10.04	-1.30	0.74	20.97	125	22.27
DH5	2441.0	-11.34	1.19	10.04	-0.11	0.97	20.97	125	21.08
DH5	2480.0	-12.10	1.21	10.04	-0.85	0.82	20.97	125	21.82
2-DH5	2402.0	-11.20	1.18	10.04	0.02	1.00	20.97	125	20.95
2-DH5	2441.0	-10.27	1.19	10.04	0.96	1.25	20.97	125	20.01
2-DH5	2480.0	-10.70	1.21	10.04	0.55	1.14	20.97	125	20.42
3-DH5	2402.0	-10.53	1.18	10.04	0.69	1.17	20.97	125	20.28
3-DH5	2441.0	-9.68	1.19	10.04	1.55	1.43	20.97	125	19.42
3-DH5	2480.0	-10.35	1.21	10.04	0.90	1.23	20.97	125	20.07

Sample Calculation:

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

UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Semi Anechoic Chamber
 Date October 25, 2013 October 25, 2013
 Temperature / Humidity 25 deg.C , 43 %RH 25 deg.C , 43 %RH
 Engineer Tatsuya Arai Wataru Kojima
 Mode Tx, 2402 MHz
 Tx, Bluetooth, BDR, PRBS9

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.	44.185	QP	35.7	13.0	7.2	31.8	24.1	40.0	15.9	371	211	
Hori.	57.750	QP	36.8	8.6	7.4	31.8	21.0	40.0	19.0	349	216	
Hori.	335.984	QP	42.6	16.7	7.1	31.8	34.6	46.0	11.4	100	102	
Hori.	960.000	QP	29.1	24.6	10.0	30.9	32.8	46.0	13.2	100	263	
Hori.	960.047	QP	32.2	24.6	10.0	30.9	35.9	53.9	18.0	100	186	
Hori.	1920.036	PK	53.6	26.4	3.7	35.3	48.4	73.9	25.5	100	265	
Hori.	2271.917	PK	47.4	27.6	4.0	35.1	43.9	73.9	30.0	100	347	
Hori.	2297.964	PK	46.9	27.7	4.0	35.1	43.5	73.9	30.4	100	347	
Hori.	2390.000	PK	46.8	28.1	4.1	35.1	43.9	73.9	30.0	127	324	
Hori.	2505.958	PK	49.0	28.5	4.3	35.0	46.8	73.9	27.1	100	20	
Hori.	2532.010	PK	48.7	28.5	4.4	35.0	46.6	73.9	27.3	100	20	
Hori.	2557.971	PK	49.1	28.6	4.4	35.0	47.1	73.9	26.8	100	20	
Hori.	4804.000	PK	47.4	32.2	6.0	34.7	50.9	73.9	23.0	127	86	
Hori.	7206.000	PK	44.7	37.1	7.5	35.0	54.3	73.9	19.6	100	0	
Hori.	1920.036	AV	48.3	26.4	3.7	35.3	43.1	53.9	10.8	100	265	
Hori.	2271.917	AV	36.1	27.6	4.0	35.1	32.6	53.9	21.3	100	347	
Hori.	2297.964	AV	35.1	27.7	4.0	35.1	31.7	53.9	22.2	100	347	
Hori.	2390.000	AV	33.9	28.1	4.1	35.1	31.0	53.9	22.9	127	324	
Hori.	2505.958	AV	39.4	28.5	4.3	35.0	37.2	53.9	16.7	100	20	
Hori.	2532.010	AV	39.0	28.5	4.4	35.0	36.9	53.9	17.0	100	20	
Hori.	2557.971	AV	39.0	28.6	4.4	35.0	37.0	53.9	16.9	100	20	
Hori.	7206.000	AV	31.7	37.1	7.5	35.0	41.3	53.9	12.6	100	0	
Vert.	31.297	QP	26.4	17.8	6.9	31.8	19.3	40.0	20.7	100	58	
Vert.	57.750	QP	33.7	8.6	7.4	31.8	17.9	40.0	22.1	100	143	
Vert.	960.000	QP	28.4	24.6	10.0	30.9	32.1	46.0	13.9	100	266	
Vert.	960.047	QP	31.5	24.6	10.0	30.9	35.2	53.9	18.7	100	266	
Vert.	1920.036	PK	49.8	26.4	3.7	35.3	44.6	73.9	29.3	100	116	
Vert.	2271.917	PK	48.9	27.6	4.0	35.1	45.4	73.9	28.5	100	314	
Vert.	2297.964	PK	48.9	27.7	4.0	35.1	45.5	73.9	28.4	100	314	
Vert.	2390.000	PK	46.6	28.1	4.1	35.1	43.7	73.9	30.2	100	295	
Vert.	2505.958	PK	49.6	28.5	4.3	35.0	47.4	73.9	26.5	100	300	
Vert.	2532.010	PK	49.0	28.5	4.4	35.0	46.9	73.9	27.0	100	300	
Vert.	2557.971	PK	49.9	28.6	4.4	35.0	47.9	73.9	26.0	100	300	
Vert.	4804.000	PK	48.1	32.2	6.0	34.7	51.6	73.9	22.3	100	295	
Vert.	7206.000	PK	45.3	37.1	7.5	35.0	54.9	73.9	19.0	100	0	
Vert.	1920.036	AV	41.3	26.4	3.7	35.3	36.1	53.9	17.8	100	116	
Vert.	2271.917	AV	39.7	27.6	4.0	35.1	36.2	53.9	17.7	100	314	
Vert.	2297.964	AV	39.5	27.7	4.0	35.1	36.1	53.9	17.8	100	314	
Vert.	2390.000	AV	33.9	28.1	4.1	35.1	31.0	53.9	22.9	100	295	
Vert.	2505.958	AV	41.2	28.5	4.3	35.0	39.0	53.9	14.9	100	300	
Vert.	2532.010	AV	40.2	28.5	4.4	35.0	38.1	53.9	15.8	100	300	
Vert.	2557.971	AV	40.9	28.6	4.4	35.0	38.9	53.9	15.0	100	300	
Vert.	4804.000	AV	36.0	32.2	6.0	34.7	39.5	53.9	14.4	100	295	
Vert.	7206.000	AV	31.8	37.1	7.5	35.0	41.4	53.9	12.5	100	0	

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

*Distance factor [dB](15GHz - 40GHz)= 20 x log (3.0[m] / 1.0[m]) = 9.5 [dB]

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	92.0	28.1	4.1	35.1	89.1	-	-	100k/300k
Hori.	2400.000	PK	44.3	28.1	4.1	35.1	41.4	69.1	27.7	100k/300k
Vert.	2402.000	PK	93.2	28.1	4.1	35.1	90.3	-	-	100k/300k
Vert.	2400.000	PK	44.8	28.1	4.1	35.1	41.9	70.3	28.4	100k/300k

Result = Reading + Ant Factor + Loss(Cable) - Gain(Amplifier)

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Semi Anechoic Chamber
Date October 25, 2013 October 25, 2013
Temperature / Humidity 25 deg.C , 43 %RH 25 deg.C , 43 %RH
Engineer Tatsuya Arai Wataru Kojima
Mode Tx, 2441 MHz
 Tx, Bluetooth, BDR, PRBS9

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.	44.185	QP	36.2	13.0	7.2	31.8	24.6	40.0	15.4	351	209	
Hori.	335.974	QP	41.5	16.7	7.1	31.8	33.5	46.0	12.5	100	351	
Hori.	960.000	QP	28.7	24.6	10.0	30.9	32.4	46.0	13.6	100	181	
Hori.	960.051	QP	31.8	24.6	10.0	30.9	35.5	53.9	18.4	100	181	
Hori.	1920.061	PK	52.6	26.4	3.7	35.3	47.4	73.9	26.5	100	265	
Hori.	2285.030	PK	46.3	27.7	4.0	35.1	42.9	73.9	31.0	100	348	
Hori.	2310.881	PK	46.6	27.8	4.1	35.1	43.4	73.9	30.5	100	348	
Hori.	2544.942	PK	47.6	28.6	4.4	35.0	45.6	73.9	28.3	151	19	
Hori.	2570.988	PK	47.6	28.6	4.4	35.0	45.6	73.9	28.3	151	19	
Hori.	2597.000	PK	47.5	28.6	4.4	35.0	45.5	73.9	28.4	151	19	
Hori.	4882.000	PK	45.7	32.6	6.0	34.8	49.5	73.9	24.4	172	280	
Hori.	7323.000	PK	45.2	37.3	7.4	35.2	54.7	73.9	19.2	100	0	
Hori.	1920.061	AV	48.2	26.4	3.7	35.3	43.0	53.9	10.9	100	265	
Hori.	2285.030	AV	34.4	27.7	4.0	35.1	31.0	53.9	22.9	100	348	
Hori.	2310.881	AV	34.7	27.8	4.1	35.1	31.5	53.9	22.4	100	348	
Hori.	2544.942	AV	37.1	28.6	4.4	35.0	35.1	53.9	18.8	151	19	
Hori.	2570.988	AV	35.8	28.6	4.4	35.0	33.8	53.9	20.1	151	19	
Hori.	2597.000	AV	33.3	28.6	4.4	35.0	31.3	53.9	22.6	151	19	
Hori.	4882.000	AV	32.7	32.6	6.0	34.8	36.5	53.9	17.4	172	280	
Hori.	7323.000	AV	31.6	37.3	7.4	35.2	41.1	53.9	12.8	100	0	
Vert.	31.297	QP	28.3	17.8	6.9	31.8	21.2	40.0	18.8	100	140	
Vert.	44.185	QP	38.9	13.0	7.2	31.8	27.3	40.0	12.7	100	111	
Vert.	960.000	QP	28.5	24.6	10.0	30.9	32.2	46.0	13.8	100	269	
Vert.	960.047	QP	31.6	24.6	10.0	30.9	35.3	53.9	18.6	100	269	
Vert.	1920.101	PK	48.5	26.4	3.7	35.3	43.3	73.9	30.6	100	115	
Vert.	2285.030	PK	48.0	27.7	4.0	35.1	44.6	73.9	29.3	100	313	
Vert.	2310.881	PK	49.2	27.8	4.1	35.1	46.0	73.9	27.9	100	313	
Vert.	2544.942	PK	48.5	28.6	4.4	35.0	46.5	73.9	27.4	100	300	
Vert.	2570.988	PK	47.9	28.6	4.4	35.0	45.9	73.9	28.0	100	300	
Vert.	2597.000	PK	47.1	28.6	4.4	35.0	45.1	73.9	28.8	100	300	
Vert.	4882.000	PK	45.5	32.6	6.0	34.8	49.3	73.9	24.6	100	344	
Vert.	7323.000	PK	44.8	37.3	7.4	35.2	54.3	73.9	19.6	100	0	
Vert.	1920.101	AV	40.6	26.4	3.7	35.3	35.4	53.9	18.5	100	115	
Vert.	2285.030	AV	37.5	27.7	4.0	35.1	34.1	53.9	19.8	100	313	
Vert.	2310.881	AV	38.7	27.8	4.1	35.1	35.5	53.9	18.4	100	313	
Vert.	2544.942	AV	37.5	28.6	4.4	35.0	35.5	53.9	18.4	100	300	
Vert.	2570.988	AV	36.7	28.6	4.4	35.0	34.7	53.9	19.2	100	300	
Vert.	2597.000	AV	34.9	28.6	4.4	35.0	32.9	53.9	21.0	100	300	
Vert.	4882.000	AV	33.4	32.6	6.0	34.8	37.2	53.9	16.7	100	344	
Vert.	7323.000	AV	31.6	37.3	7.4	35.2	41.1	53.9	12.8	100	0	

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

*Distance factor [dB](15GHz - 40GHz)= 20 x log (3.0[m] / 1.0[m]) = 9.5 [dB]

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Semi Anechoic Chamber
Date October 25, 2013 October 25, 2013
Temperature / Humidity 25 deg.C , 43 %RH 25 deg.C , 43 %RH
Engineer Tatsuya Arai Wataru Kojima
Mode Tx, 2480 MHz
 Tx, Bluetooth, BDR, PRBS9

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.	44.185	QP	35.5	13.0	7.2	31.8	23.9	40.0	16.1	387	208	
Hori.	335.978	QP	42.2	16.7	7.1	31.8	34.2	46.0	11.8	100	354	
Hori.	960.000	QP	30.3	24.6	10.0	30.9	34.0	46.0	12.0	118	237	
Hori.	960.047	QP	33.5	24.6	10.0	30.9	37.2	53.9	16.7	118	237	
Hori.	1920.000	PK	53.0	26.4	3.7	35.3	47.8	73.9	26.1	100	265	
Hori.	2323.987	PK	47.9	27.8	4.1	35.1	44.7	73.9	29.2	100	139	
Hori.	2349.973	PK	48.6	27.9	4.1	35.1	45.5	73.9	28.4	100	139	
Hori.	2483.500	PK	51.7	28.4	4.2	35.0	49.3	73.9	24.6	100	324	
Hori.	2583.972	PK	49.2	28.6	4.4	35.0	47.2	73.9	26.7	100	19	
Hori.	2609.980	PK	49.4	28.7	4.4	35.0	47.5	73.9	26.4	100	19	
Hori.	2635.973	PK	47.6	28.7	4.4	35.0	45.7	73.9	28.2	100	19	
Hori.	4960.000	PK	46.7	33.0	6.1	34.8	51.0	73.9	22.9	124	112	
Hori.	7440.000	PK	44.3	37.4	7.5	35.4	53.8	73.9	20.1	100	0	
Hori.	1920.000	AV	48.2	26.4	3.7	35.3	43.0	53.9	10.9	100	265	
Hori.	2323.987	AV	37.8	27.8	4.1	35.1	34.6	53.9	19.3	100	139	
Hori.	2349.973	AV	36.8	27.9	4.1	35.1	33.7	53.9	20.2	100	139	
Hori.	2483.500	AV	43.1	28.4	4.2	35.0	40.7	53.9	13.2	100	324	
Hori.	2583.972	AV	40.1	28.6	4.4	35.0	38.1	53.9	15.8	100	19	
Hori.	2609.980	AV	38.1	28.7	4.4	35.0	36.2	53.9	17.7	100	19	
Hori.	2635.973	AV	37.3	28.7	4.4	35.0	35.4	53.9	18.5	100	19	
Hori.	4960.000	AV	36.5	33.0	6.1	34.8	40.8	53.9	13.1	124	112	
Hori.	7440.000	AV	31.5	37.4	7.5	35.4	41.0	53.9	12.9	100	0	
Vert.	36.314	QP	33.4	16.0	7.0	31.8	24.6	40.0	15.4	100	295	
Vert.	44.185	QP	36.8	13.0	7.2	31.8	25.2	40.0	14.8	100	213	
Vert.	960.000	QP	28.3	24.6	10.0	30.9	32.0	46.0	14.0	100	267	
Vert.	960.045	QP	31.3	24.6	10.0	30.9	35.0	53.9	18.9	100	267	
Vert.	1920.000	PK	47.8	26.4	3.7	35.3	42.6	73.9	31.3	100	115	
Vert.	2323.987	PK	51.3	27.8	4.1	35.1	48.1	73.9	25.8	100	313	
Vert.	2349.973	PK	51.3	27.9	4.1	35.1	48.2	73.9	25.7	100	313	
Vert.	2483.500	PK	52.8	28.4	4.2	35.0	50.4	73.9	23.5	100	299	
Vert.	2583.972	PK	50.3	28.6	4.4	35.0	48.3	73.9	25.6	100	296	
Vert.	2609.980	PK	48.6	28.7	4.4	35.0	46.7	73.9	27.2	100	296	
Vert.	2635.973	PK	48.1	28.7	4.4	35.0	46.2	73.9	27.7	100	296	
Vert.	4960.000	PK	46.5	33.0	6.1	34.8	50.8	73.9	23.1	100	103	
Vert.	7440.000	PK	44.4	37.4	7.5	35.4	53.9	73.9	20.0	100	0	
Vert.	1920.000	AV	41.1	26.4	3.7	35.3	35.9	53.9	18.0	100	115	
Vert.	2323.987	AV	43.6	27.8	4.1	35.1	40.4	53.9	13.5	100	313	
Vert.	2349.973	AV	43.5	27.9	4.1	35.1	40.4	53.9	13.5	100	313	
Vert.	2483.500	AV	45.1	28.4	4.2	35.0	42.7	53.9	11.2	100	299	
Vert.	2583.972	AV	42.1	28.6	4.4	35.0	40.1	53.9	13.8	100	296	
Vert.	2609.980	AV	39.5	28.7	4.4	35.0	37.6	53.9	16.3	100	296	
Vert.	2635.973	AV	38.1	28.7	4.4	35.0	36.2	53.9	17.7	100	296	
Vert.	4960.000	AV	35.0	33.0	6.1	34.8	39.3	53.9	14.6	100	103	
Vert.	7440.000	AV	31.5	37.4	7.5	35.4	41.0	53.9	12.9	100	0	

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

*Distance factor [dB](15GHz - 40GHz)= 20 x log (3.0[m] / 1.0[m]) = 9.5 [dB]

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Semi Anechoic Chamber
 Date October 25, 2013 October 25, 2013
 Temperature / Humidity 25 deg.C , 43 %RH 25 deg.C , 43 %RH
 Engineer Tatsuya Arai Wataru Kojima
 Mode Tx, 2402 MHz
 Tx, Bluetooth, EDR, PRBS9

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.	44.185	QP	35.4	13.0	7.2	31.8	23.8	40.0	16.2	344	197	
Hori.	57.750	QP	35.5	8.6	7.4	31.8	19.7	40.0	20.3	344	228	
Hori.	335.975	QP	42.2	16.7	7.1	31.8	34.2	46.0	11.8	100	356	
Hori.	960.000	QP	29.3	24.6	10.0	30.9	33.0	46.0	13.0	100	139	
Hori.	960.045	QP	32.5	24.6	10.0	30.9	36.2	53.9	17.7	100	139	
Hori.	1920.001	PK	52.5	26.4	3.7	35.3	47.3	73.9	26.6	100	264	
Hori.	2246.040	PK	46.6	27.5	4.0	35.1	43.0	73.9	30.9	100	349	
Hori.	2271.936	PK	47.4	27.6	4.0	35.1	43.9	73.9	30.0	100	349	
Hori.	2390.000	PK	46.4	28.1	4.1	35.1	43.5	73.9	30.4	120	324	
Hori.	2506.029	PK	48.7	28.5	4.3	35.0	46.5	73.9	27.4	113	112	
Hori.	2558.019	PK	47.5	28.6	4.4	35.0	45.5	73.9	28.4	113	112	
Hori.	4804.000	PK	45.4	32.2	6.0	34.7	48.9	73.9	25.0	117	322	
Hori.	7206.000	PK	44.8	37.1	7.5	35.0	54.4	73.9	19.5	100	0	
Hori.	1920.001	AV	48.2	26.4	3.7	35.3	43.0	53.9	10.9	100	264	
Hori.	2246.040	AV	34.8	27.5	4.0	35.1	31.2	53.9	22.7	100	349	
Hori.	2271.936	AV	35.1	27.6	4.0	35.1	31.6	53.9	22.3	100	349	
Hori.	2390.000	AV	34.0	28.1	4.1	35.1	31.1	53.9	22.8	120	324	
Hori.	2506.029	AV	38.5	28.5	4.3	35.0	36.3	53.9	17.6	113	112	
Hori.	2558.019	AV	35.3	28.6	4.4	35.0	33.3	53.9	20.6	113	112	
Hori.	4804.000	AV	33.4	32.2	6.0	34.7	36.9	53.9	17.0	117	322	
Hori.	7206.000	AV	31.8	37.1	7.5	35.0	41.4	53.9	12.5	100	0	
Vert.	44.185	QP	39.0	13.0	7.2	31.8	27.4	40.0	12.6	100	148	
Vert.	57.750	QP	36.4	8.6	7.4	31.8	20.6	40.0	19.4	100	159	
Vert.	960.000	QP	28.3	24.6	10.0	30.9	32.0	46.0	14.0	100	264	
Vert.	960.045	QP	31.4	24.6	10.0	30.9	35.1	53.9	18.8	100	264	
Vert.	1920.001	PK	48.4	26.4	3.7	35.3	43.2	73.9	30.7	100	115	
Vert.	2246.040	PK	47.6	27.5	4.0	35.1	44.0	73.9	29.9	100	313	
Vert.	2271.936	PK	48.6	27.6	4.0	35.1	45.1	73.9	28.8	100	313	
Vert.	2390.000	PK	46.3	28.1	4.1	35.1	43.4	73.9	30.5	100	311	
Vert.	2506.029	PK	49.7	28.5	4.3	35.0	47.5	73.9	26.4	100	299	
Vert.	2558.019	PK	49.6	28.6	4.4	35.0	47.6	73.9	26.3	100	299	
Vert.	4804.000	PK	48.2	32.2	6.0	34.7	51.7	73.9	22.2	100	295	
Vert.	7206.000	PK	44.7	37.1	7.5	35.0	54.3	73.9	19.6	100	0	
Vert.	1920.001	AV	41.4	26.4	3.7	35.3	36.2	53.9	17.7	100	115	
Vert.	2246.040	AV	36.4	27.5	4.0	35.1	32.8	53.9	21.1	100	313	
Vert.	2271.936	AV	38.3	27.6	4.0	35.1	34.8	53.9	19.1	100	313	
Vert.	2390.000	AV	34.0	28.1	4.1	35.1	31.1	53.9	22.8	100	311	
Vert.	2506.029	AV	39.6	28.5	4.3	35.0	37.4	53.9	16.5	100	299	
Vert.	2558.019	AV	39.5	28.6	4.4	35.0	37.5	53.9	16.4	100	299	
Vert.	4804.000	AV	35.0	32.2	6.0	34.7	38.5	53.9	15.4	100	295	
Vert.	7206.000	AV	31.8	37.1	7.5	35.0	41.4	53.9	12.5	100	0	

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

*Distance factor [dB](15GHz - 40GHz)= 20 x log (3.0[m] / 1.0[m]) = 9.5 [dB]

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	92.7	28.1	4.1	35.1	89.8	-	-	100k/300k
Hori.	2400.000	PK	45.3	28.1	4.1	35.1	42.4	69.8	27.4	100k/300k
Vert.	2402.000	PK	94.9	28.1	4.1	35.1	92.0	-	-	100k/300k
Vert.	2400.000	PK	47.9	28.1	4.1	35.1	45.0	72.0	27.0	100k/300k

Result = Reading + Ant Factor + Loss(Cable) - Gain(Amplifier)

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Semi Anechoic Chamber
 Date October 25, 2013 October 25, 2013
 Temperature / Humidity 25 deg.C , 43 %RH 25 deg.C , 43 %RH
 Engineer Tatsuya Arai Wataru Kojima
 Mode Tx, 2441 MHz
 Tx, Bluetooth, EDR, PRBS9

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.	44.185	QP	35.0	13.0	7.2	31.8	23.4	40.0	16.6	215	216	
Hori.	335.979	QP	41.1	16.7	7.1	31.8	33.1	46.0	12.9	100	354	
Hori.	960.000	QP	30.3	24.6	10.0	30.9	34.0	46.0	12.0	114	238	
Hori.	960.046	QP	33.5	24.6	10.0	30.9	37.2	53.9	16.7	114	238	
Hori.	1919.956	PK	52.7	26.4	3.7	35.3	47.5	73.9	26.4	100	266	
Hori.	2311.015	PK	48.1	27.8	4.1	35.1	44.9	73.9	29.0	100	137	
Hori.	2337.000	PK	47.7	27.9	4.1	35.1	44.6	73.9	29.3	100	137	
Hori.	2544.960	PK	49.2	28.6	4.4	35.0	47.2	73.9	26.7	153	20	
Hori.	2570.943	PK	49.0	28.6	4.4	35.0	47.0	73.9	26.9	153	20	
Hori.	2596.989	PK	48.2	28.6	4.4	35.0	46.2	73.9	27.7	153	20	
Hori.	4882.000	PK	45.6	32.6	6.0	34.8	49.4	73.9	24.5	172	84	
Hori.	7323.000	PK	44.6	37.3	7.4	35.2	54.1	73.9	19.8	100	0	
Hori.	1919.956	AV	48.3	26.4	3.7	35.3	43.1	53.9	10.8	100	266	
Hori.	2311.015	AV	36.5	27.8	4.1	35.1	33.3	53.9	20.6	100	137	
Hori.	2337.000	AV	35.8	27.9	4.1	35.1	32.7	53.9	21.2	100	137	
Hori.	2544.960	AV	38.9	28.6	4.4	35.0	36.9	53.9	17.0	153	20	
Hori.	2570.943	AV	37.7	28.6	4.4	35.0	35.7	53.9	18.2	153	20	
Hori.	2596.989	AV	36.3	28.6	4.4	35.0	34.3	53.9	19.6	153	20	
Hori.	4882.000	AV	33.4	32.6	6.0	34.8	37.2	53.9	16.7	172	84	
Hori.	7323.000	AV	31.7	37.3	7.4	35.2	41.2	53.9	12.7	100	0	
Vert.	36.314	QP	33.6	16.0	7.0	31.8	24.8	40.0	15.2	100	312	
Vert.	44.185	QP	38.9	13.0	7.2	31.8	27.3	40.0	12.7	100	103	
Vert.	960.000	QP	28.1	24.6	10.0	30.9	31.8	46.0	14.2	100	264	
Vert.	960.048	QP	31.1	24.6	10.0	30.9	34.8	53.9	19.1	100	264	
Vert.	1919.956	PK	48.3	26.4	3.7	35.3	43.1	73.9	30.8	100	115	
Vert.	2311.015	PK	50.5	27.8	4.1	35.1	47.3	73.9	26.6	100	314	
Vert.	2337.000	PK	50.0	27.9	4.1	35.1	46.9	73.9	27.0	100	314	
Vert.	2544.960	PK	49.2	28.6	4.4	35.0	47.2	73.9	26.7	100	299	
Vert.	2570.943	PK	49.6	28.6	4.4	35.0	47.6	73.9	26.3	100	299	
Vert.	2596.989	PK	48.2	28.6	4.4	35.0	46.2	73.9	27.7	100	299	
Vert.	4882.000	PK	46.9	32.6	6.0	34.8	50.7	73.9	23.2	100	311	
Vert.	7323.000	PK	44.8	37.3	7.4	35.2	54.3	73.9	19.6	100	0	
Vert.	1919.956	AV	41.3	26.4	3.7	35.3	36.1	53.9	17.8	100	115	
Vert.	2311.015	AV	41.1	27.8	4.1	35.1	37.9	53.9	16.0	100	314	
Vert.	2337.000	AV	39.6	27.9	4.1	35.1	36.5	53.9	17.4	100	314	
Vert.	2544.960	AV	39.3	28.6	4.4	35.0	37.3	53.9	16.6	100	299	
Vert.	2570.943	AV	39.1	28.6	4.4	35.0	37.1	53.9	16.8	100	299	
Vert.	2596.989	AV	37.3	28.6	4.4	35.0	35.3	53.9	18.6	100	299	
Vert.	4882.000	AV	34.7	32.6	6.0	34.8	38.5	53.9	15.4	100	311	
Vert.	7323.000	AV	31.7	37.3	7.4	35.2	41.2	53.9	12.7	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Filter (15 - 18GHz))-Distance factor(above 15GHz)) - Gain(Amplifier)
 *Distance factor [dB](15GHz - 40GHz)= 20 x log (3.0[m] / 1.0[m]) = 9.5 [dB]

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Semi Anechoic Chamber
 Date October 25, 2013 October 25, 2013
 Temperature / Humidity 25 deg.C , 43 %RH 25 deg.C , 43 %RH
 Engineer Tatsuya Arai Wataru Kojima
 Mode Tx, 2480 MHz
 Tx, Bluetooth, EDR, PRBS9

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.	44.185	QP	35.2	13.0	7.2	31.8	23.6	40.0	16.4	325	201	
Hori.	335.977	QP	42.2	16.7	7.1	31.8	34.2	46.0	11.8	100	93	
Hori.	960.000	QP	29.3	24.6	10.0	30.9	33.0	46.0	13.0	100	140	
Hori.	960.050	QP	32.4	24.6	10.0	30.9	36.1	53.9	17.8	100	140	
Hori.	1920.001	PK	52.6	26.4	3.7	35.3	47.4	73.9	26.5	100	266	
Hori.	2324.021	PK	48.7	27.8	4.1	35.1	45.5	73.9	28.4	189	137	
Hori.	2349.952	PK	48.5	27.9	4.1	35.1	45.4	73.9	28.5	189	137	
Hori.	2483.500	PK	51.0	28.4	4.2	35.0	48.6	73.9	25.3	100	82	
Hori.	2584.066	PK	49.1	28.6	4.4	35.0	47.1	73.9	26.8	100	20	
Hori.	2636.066	PK	48.5	28.7	4.4	35.0	46.6	73.9	27.3	100	20	
Hori.	4960.000	PK	46.5	33.0	6.1	34.8	50.8	73.9	23.1	126	113	
Hori.	7440.000	PK	44.4	37.4	7.5	35.4	53.9	73.9	20.0	100	0	
Hori.	1920.001	AV	48.1	26.4	3.7	35.3	42.9	53.9	11.0	100	266	
Hori.	2324.021	AV	37.5	27.8	4.1	35.1	34.3	53.9	19.6	189	137	
Hori.	2349.952	AV	37.6	27.9	4.1	35.1	34.5	53.9	19.4	189	137	
Hori.	2483.500	AV	42.4	28.4	4.2	35.0	40.0	53.9	13.9	100	82	
Hori.	2584.066	AV	38.1	28.6	4.4	35.0	36.1	53.9	17.8	100	20	
Hori.	2636.066	AV	36.8	28.7	4.4	35.0	34.9	53.9	19.0	100	20	
Hori.	4960.000	AV	34.1	33.0	6.1	34.8	38.4	53.9	15.5	126	113	
Hori.	7440.000	AV	31.5	37.4	7.5	35.4	41.0	53.9	12.9	100	0	
Vert.	31.297	QP	27.1	17.8	6.9	31.8	20.0	40.0	20.0	100	256	
Vert.	44.185	QP	38.8	13.0	7.2	31.8	27.2	40.0	12.8	100	138	
Vert.	960.000	QP	27.8	24.6	10.0	30.9	31.5	46.0	14.5	100	12	
Vert.	960.050	QP	30.7	24.6	10.0	30.9	34.4	53.9	19.5	100	12	
Vert.	1920.001	PK	48.0	26.4	3.7	35.3	42.8	73.9	31.1	100	115	
Vert.	2324.021	PK	50.8	27.8	4.1	35.1	47.6	73.9	26.3	100	314	
Vert.	2349.952	PK	50.9	27.9	4.1	35.1	47.8	73.9	26.1	100	314	
Vert.	2483.500	PK	54.0	28.4	4.2	35.0	51.6	73.9	22.3	100	297	
Vert.	2584.066	PK	49.8	28.6	4.4	35.0	47.8	73.9	26.1	100	295	
Vert.	2636.066	PK	48.2	28.7	4.4	35.0	46.3	73.9	27.6	100	295	
Vert.	4960.000	PK	46.4	33.0	6.1	34.8	50.7	73.9	23.2	100	301	
Vert.	7440.000	PK	44.2	37.4	7.5	35.4	53.7	73.9	20.2	100	0	
Vert.	1920.001	AV	41.3	26.4	3.7	35.3	36.1	53.9	17.8	100	115	
Vert.	2324.021	AV	41.7	27.8	4.1	35.1	38.5	53.9	15.4	100	314	
Vert.	2349.952	AV	41.5	27.9	4.1	35.1	38.4	53.9	15.5	100	314	
Vert.	2483.500	AV	45.8	28.4	4.2	35.0	43.4	53.9	10.5	100	297	
Vert.	2584.066	AV	40.2	28.6	4.4	35.0	38.2	53.9	15.7	100	295	
Vert.	2636.066	AV	37.5	28.7	4.4	35.0	35.6	53.9	18.3	100	295	
Vert.	4960.000	AV	34.4	33.0	6.1	34.8	38.7	53.9	15.2	100	301	
Vert.	7440.000	AV	31.5	37.4	7.5	35.4	41.0	53.9	12.9	100	0	

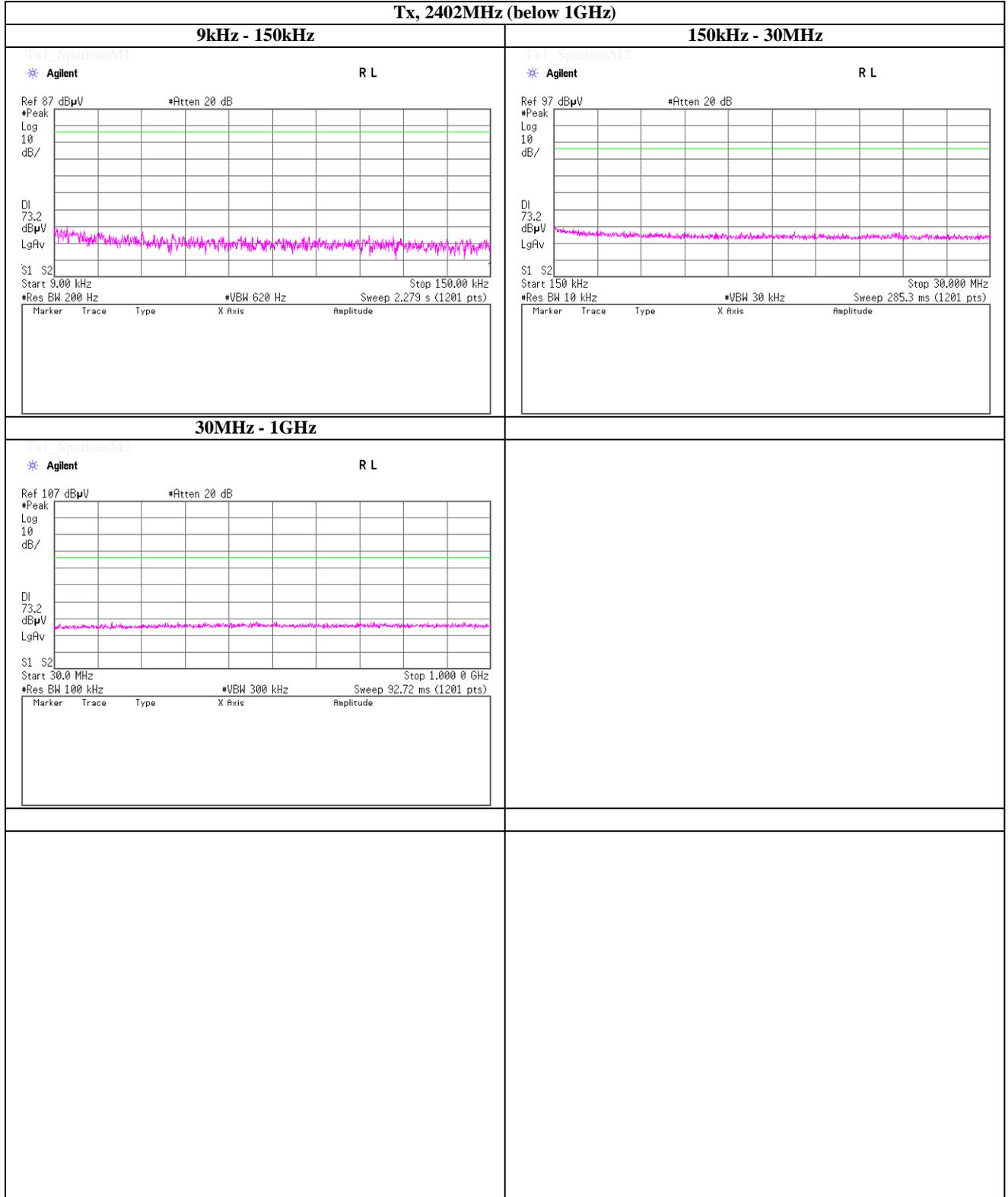
Result = Reading + Ant.Fac. + Loss (Cable+(Filter (15 - 18GHz))-Distance factor(above 15GHz)) - Gain(Amplifier)

*Distance factor [dB](15GHz - 40GHz)= 20 x log (3.0[m] / 1.0[m]) = 9.5 [dB]

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (below 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

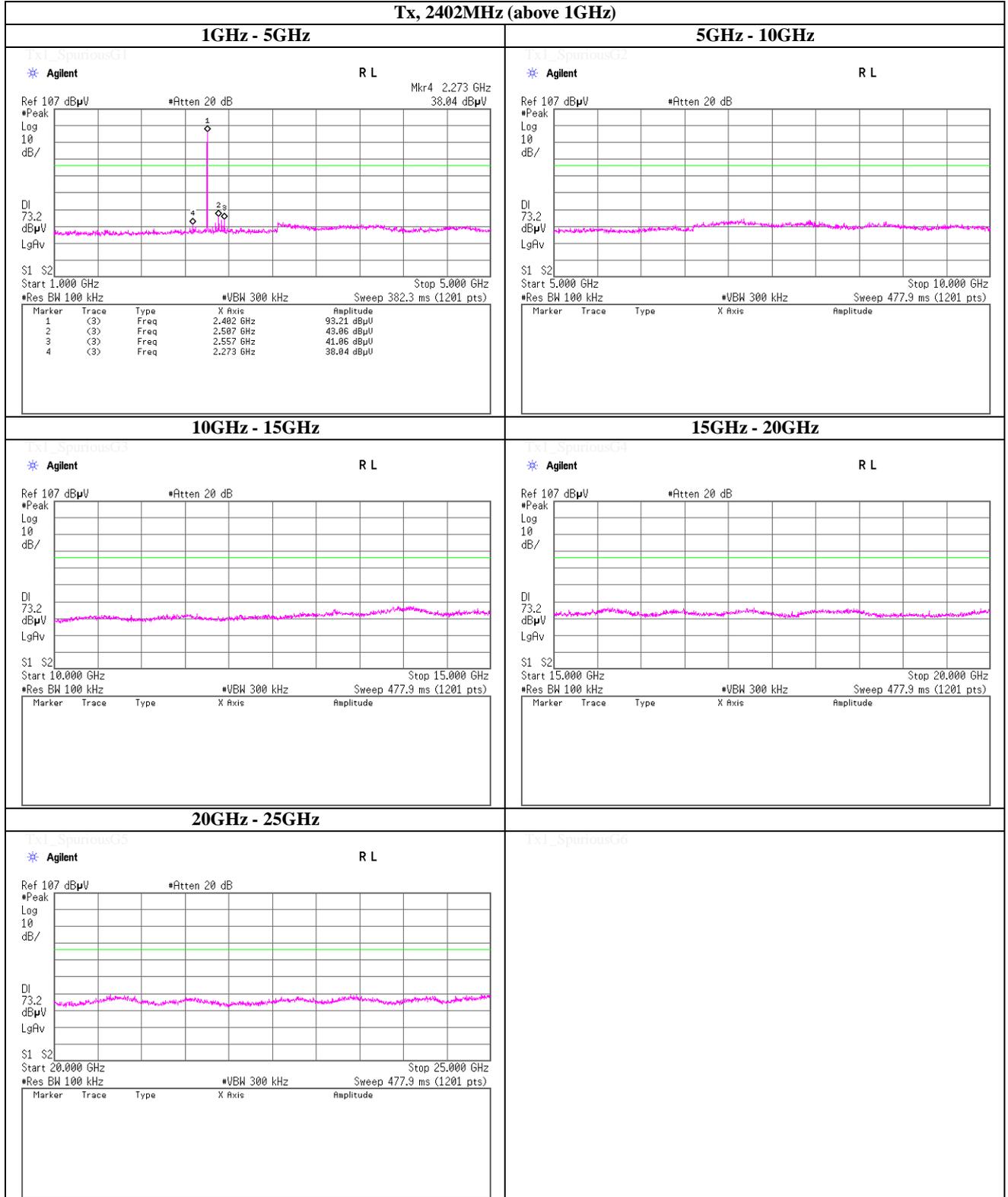
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (above 1GHz)



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

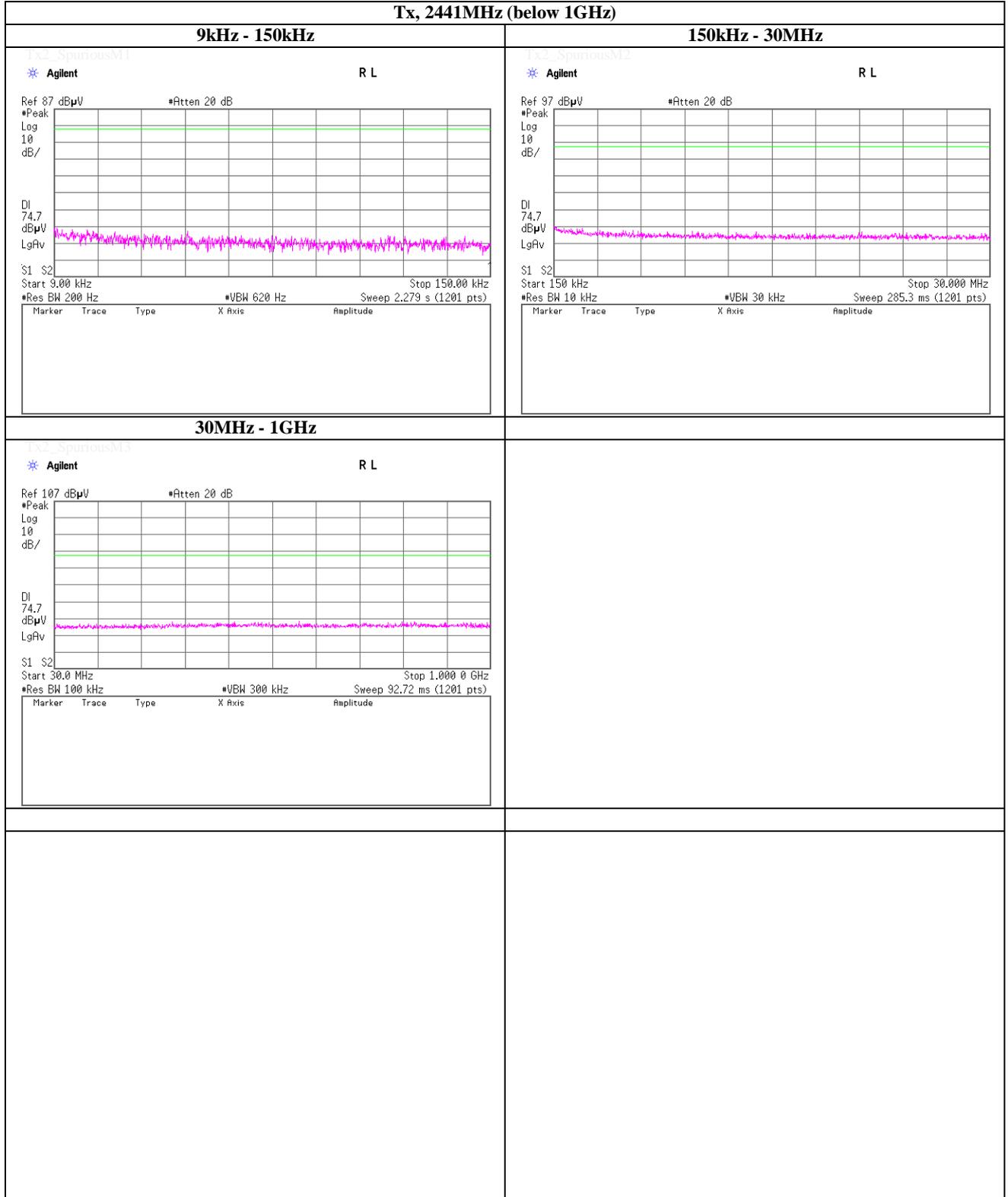
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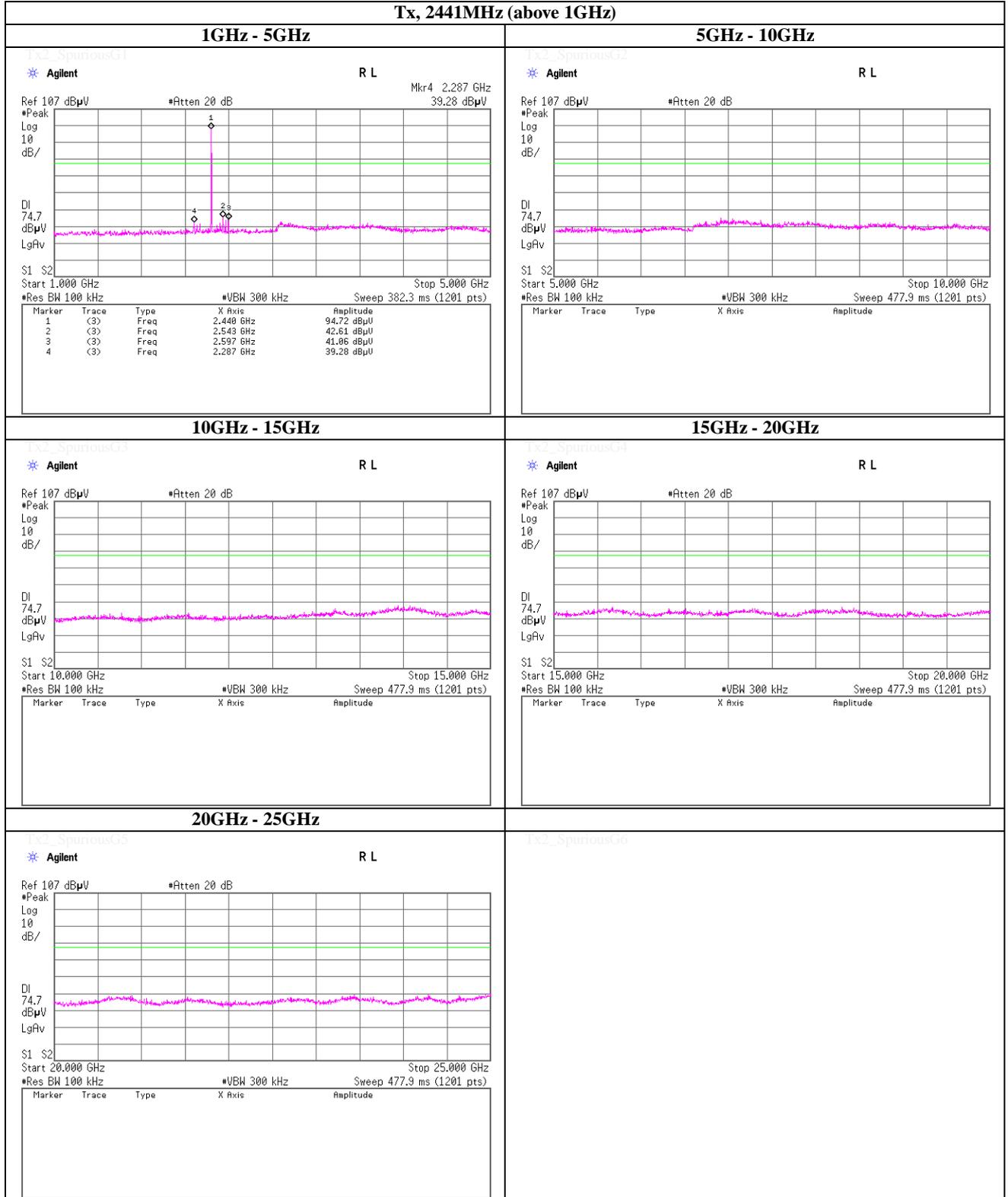
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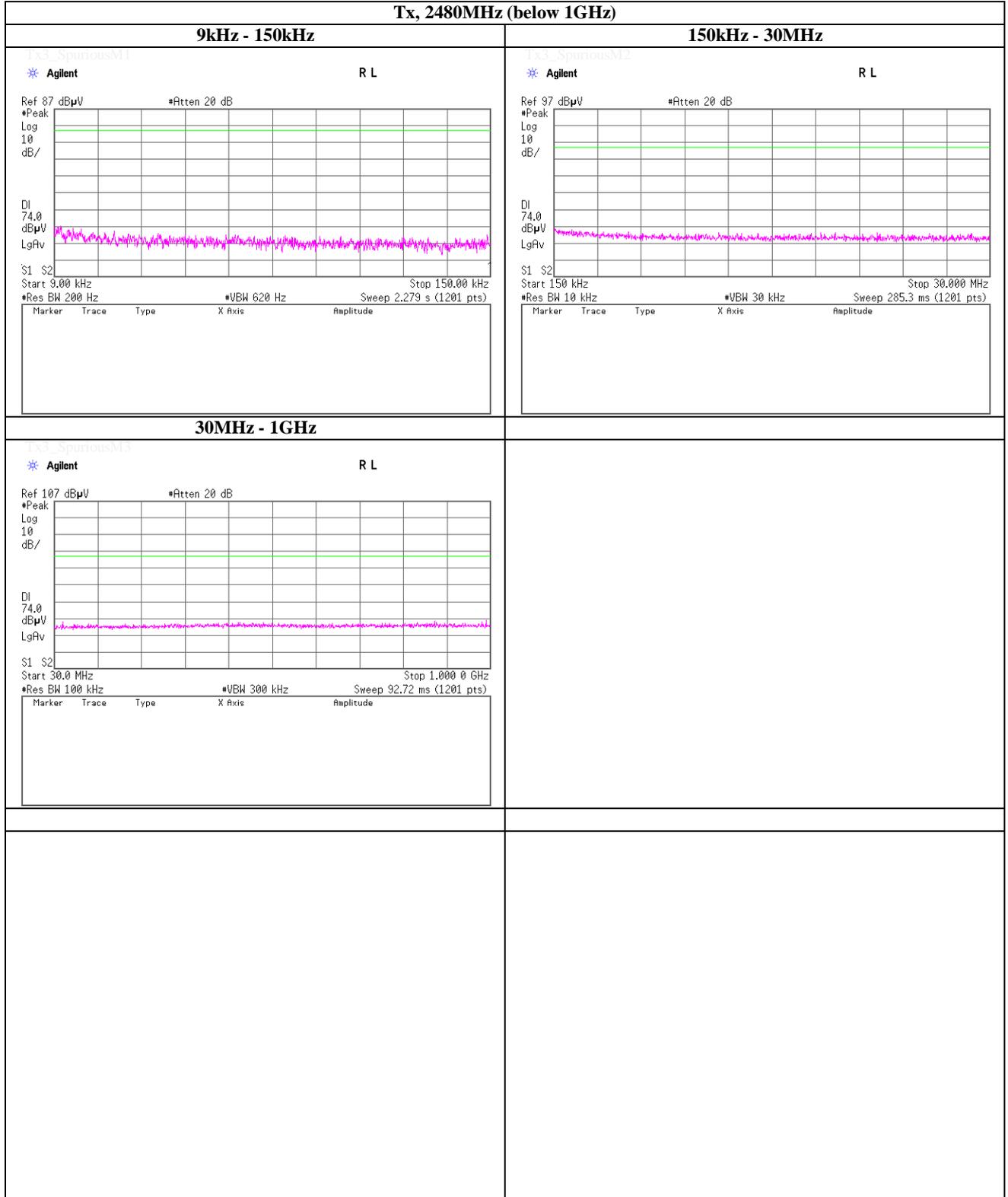
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Tx, 2480MHz (below 1GHz)



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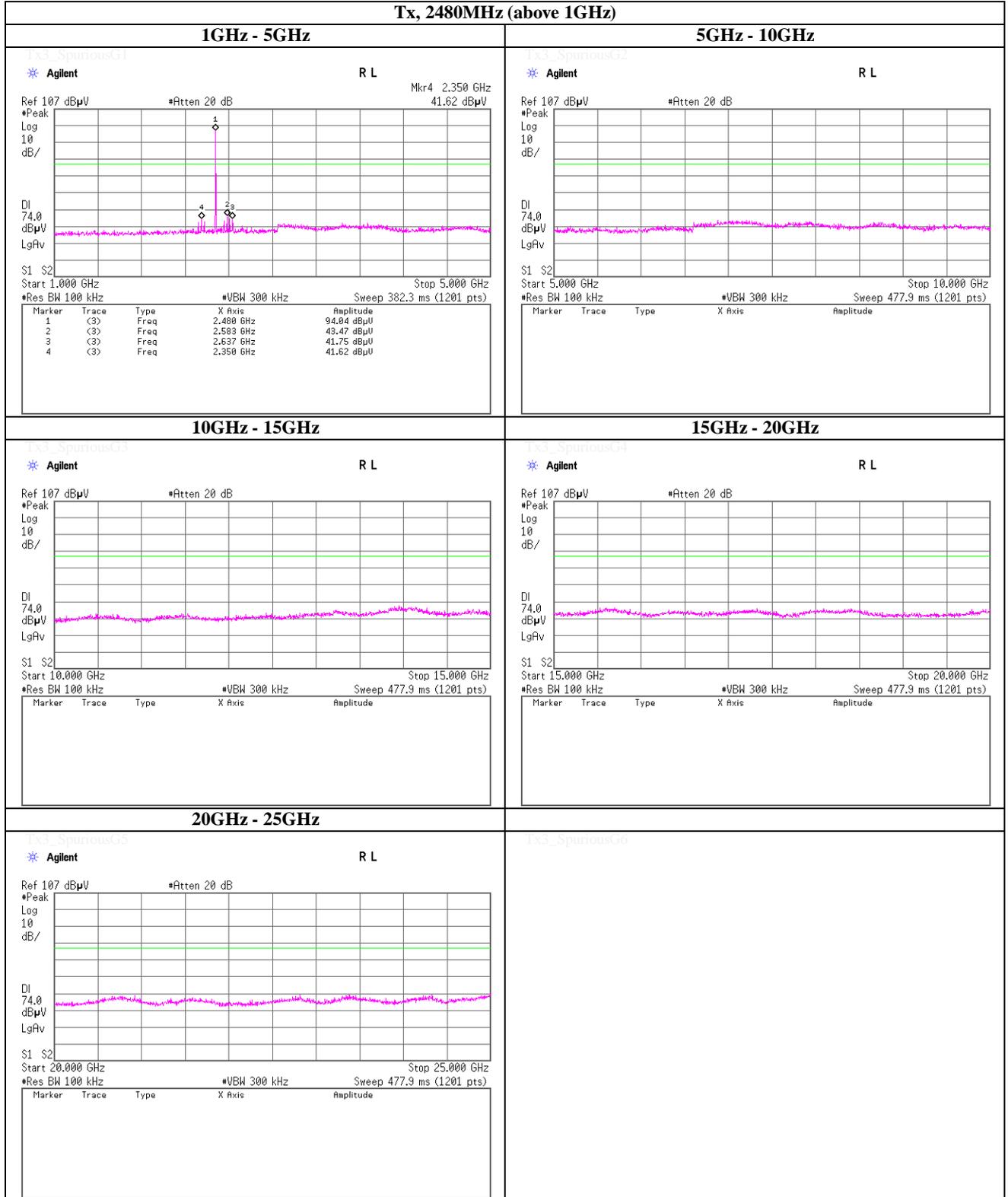
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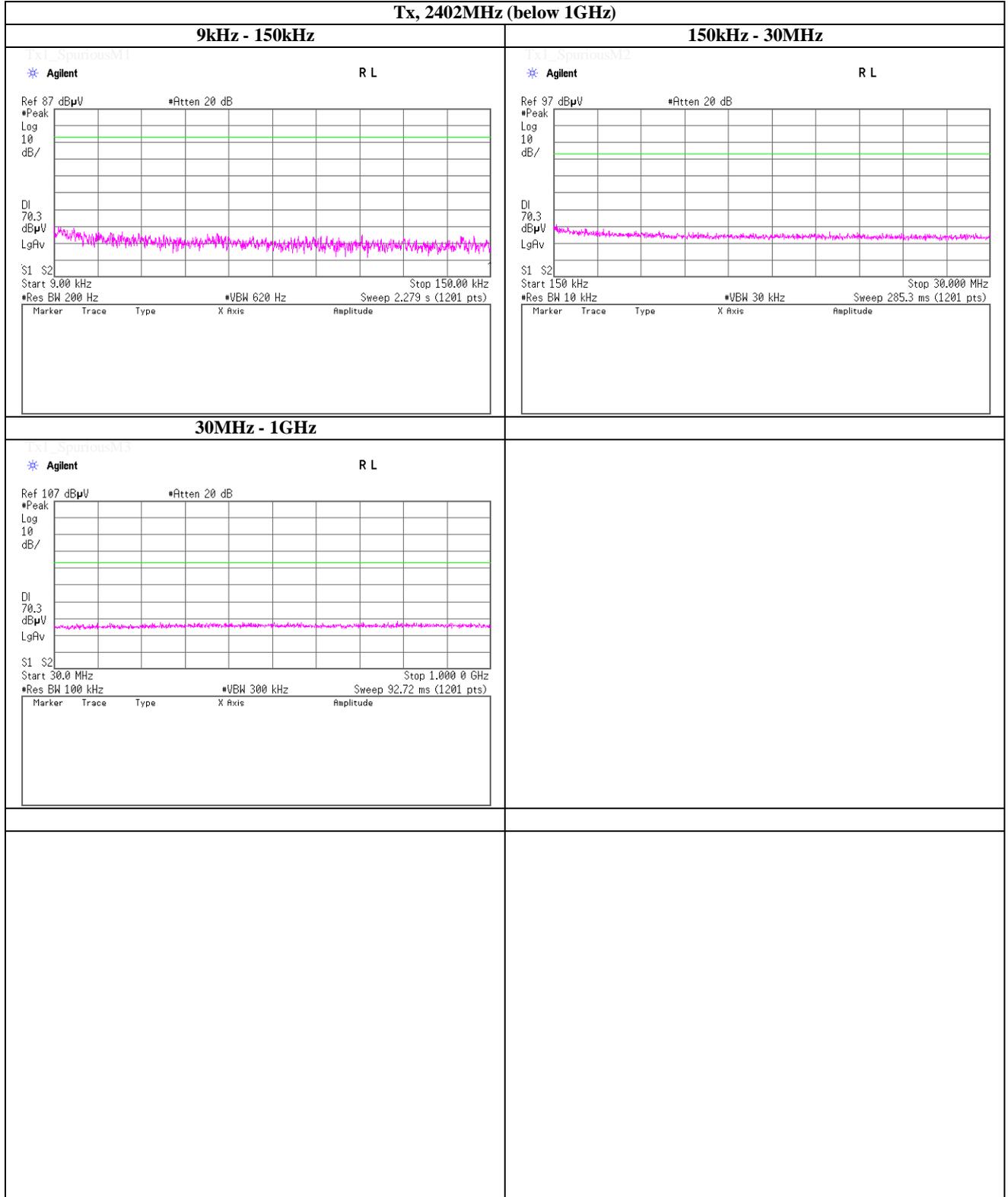
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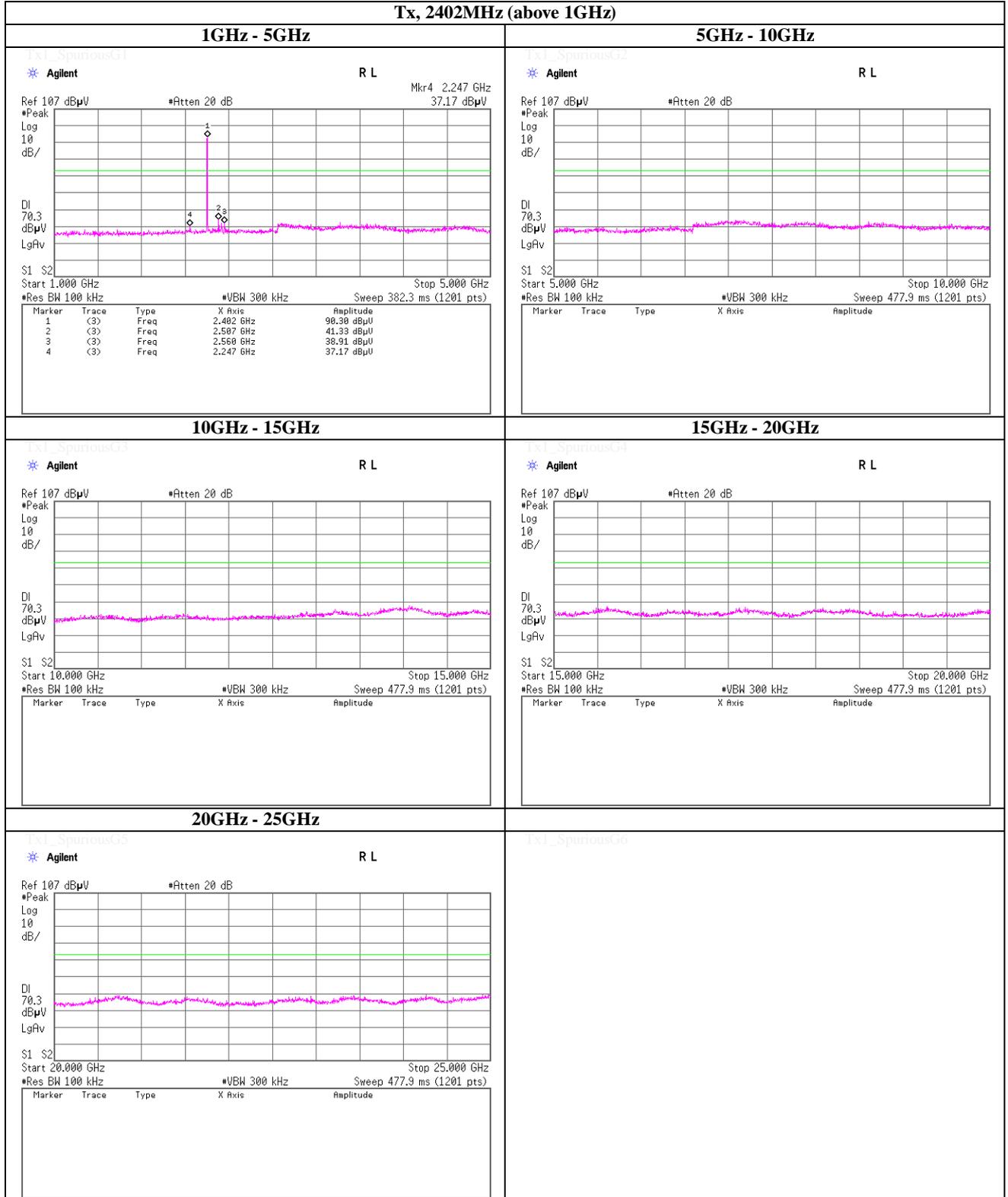
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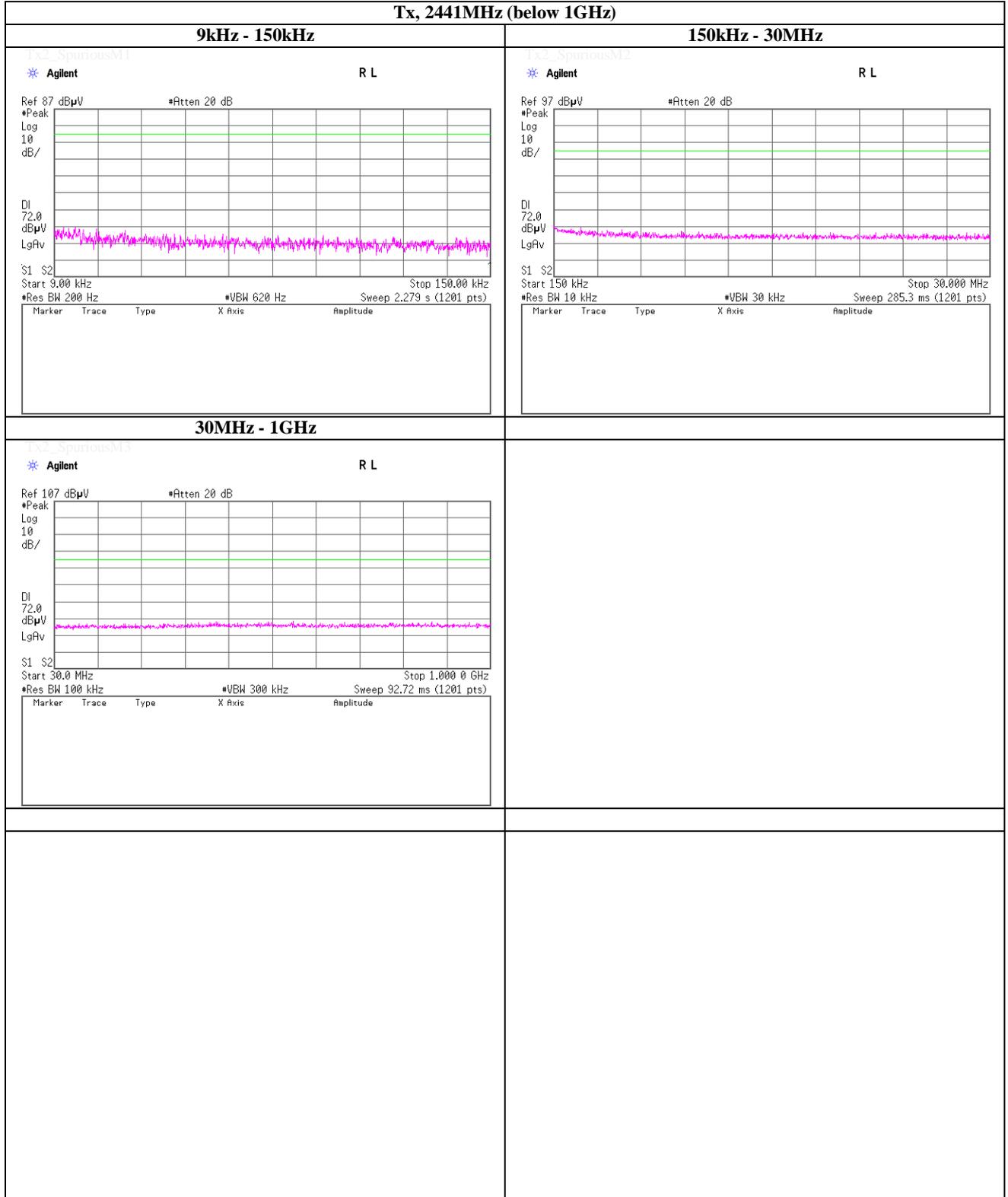
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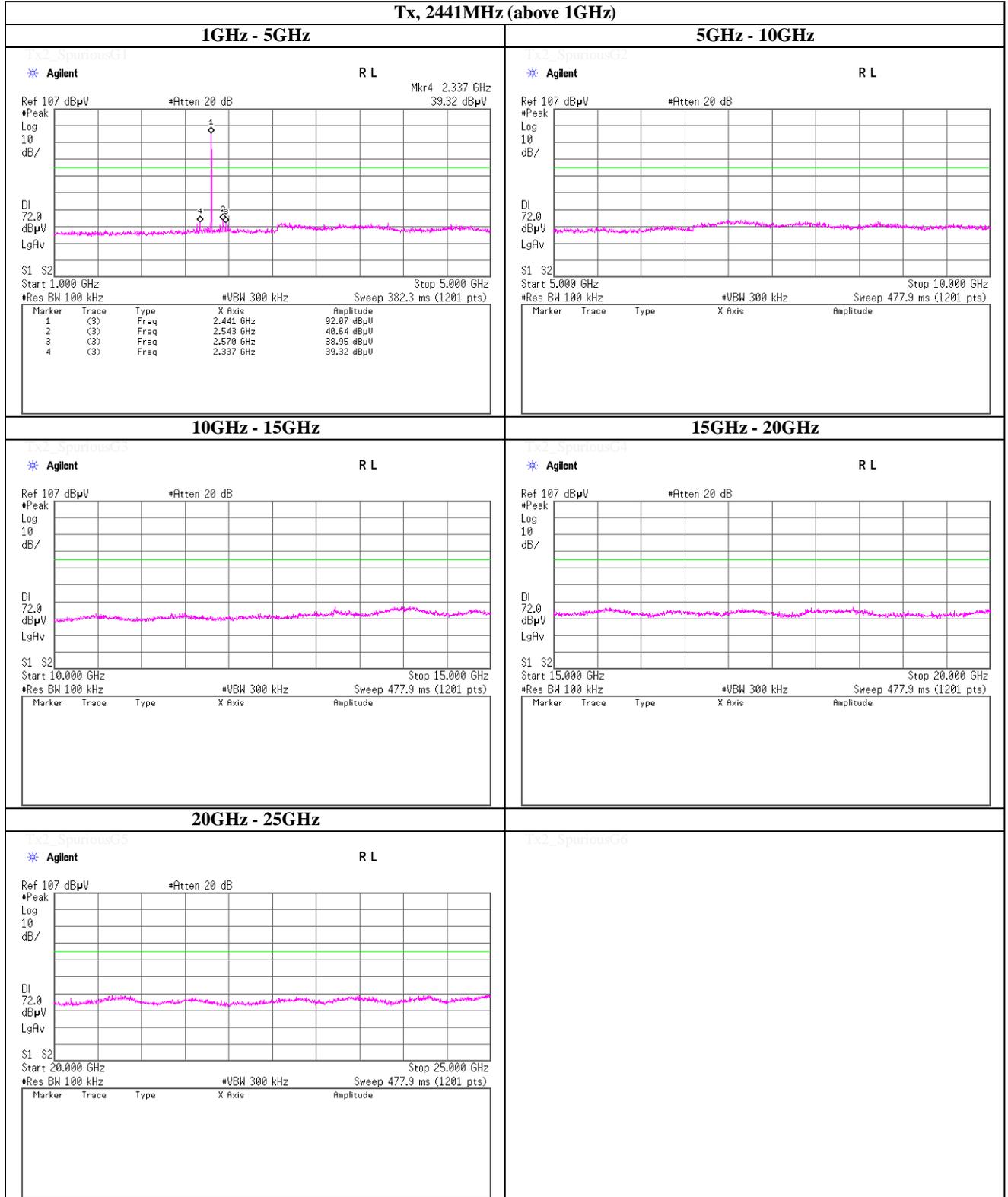
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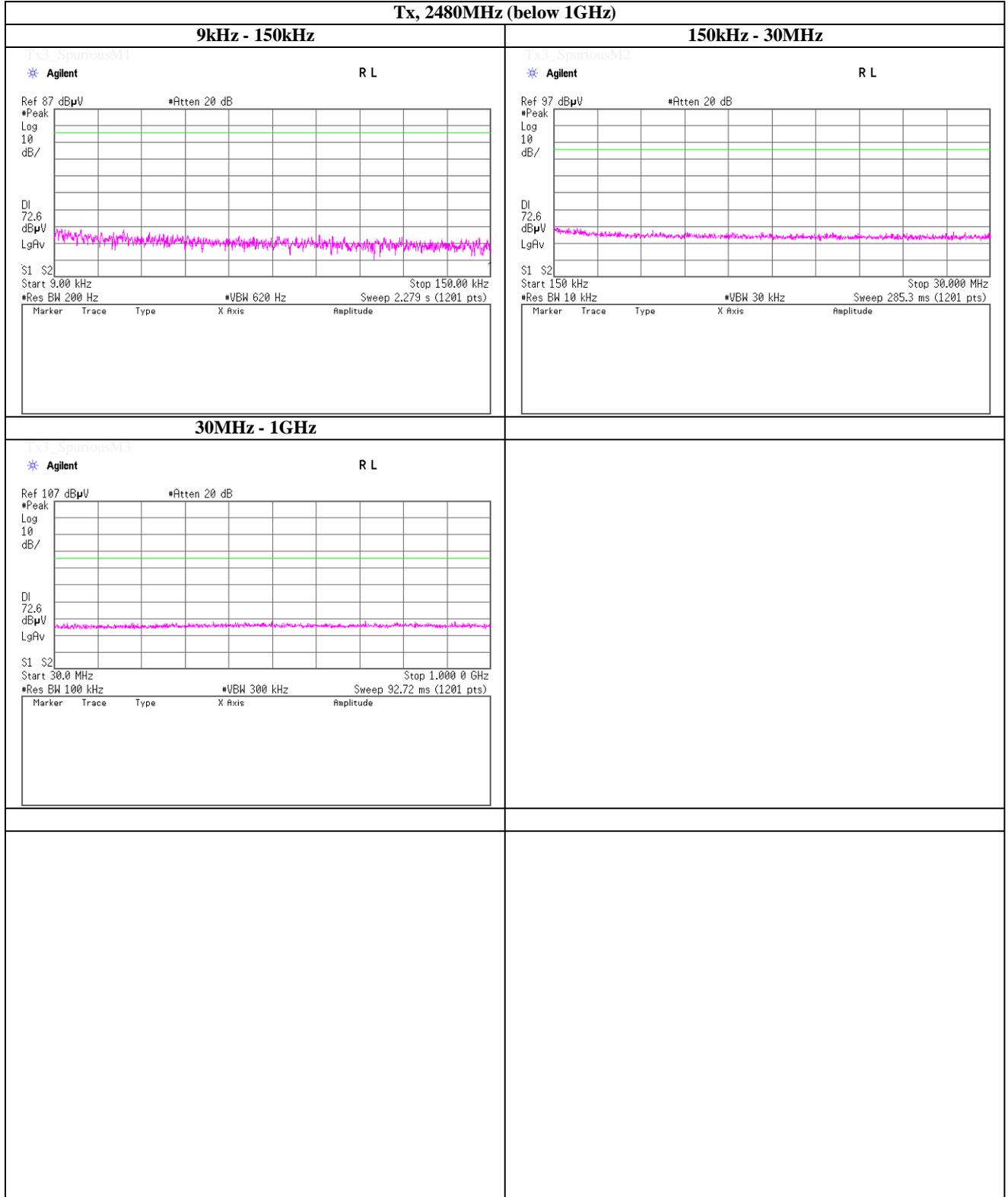
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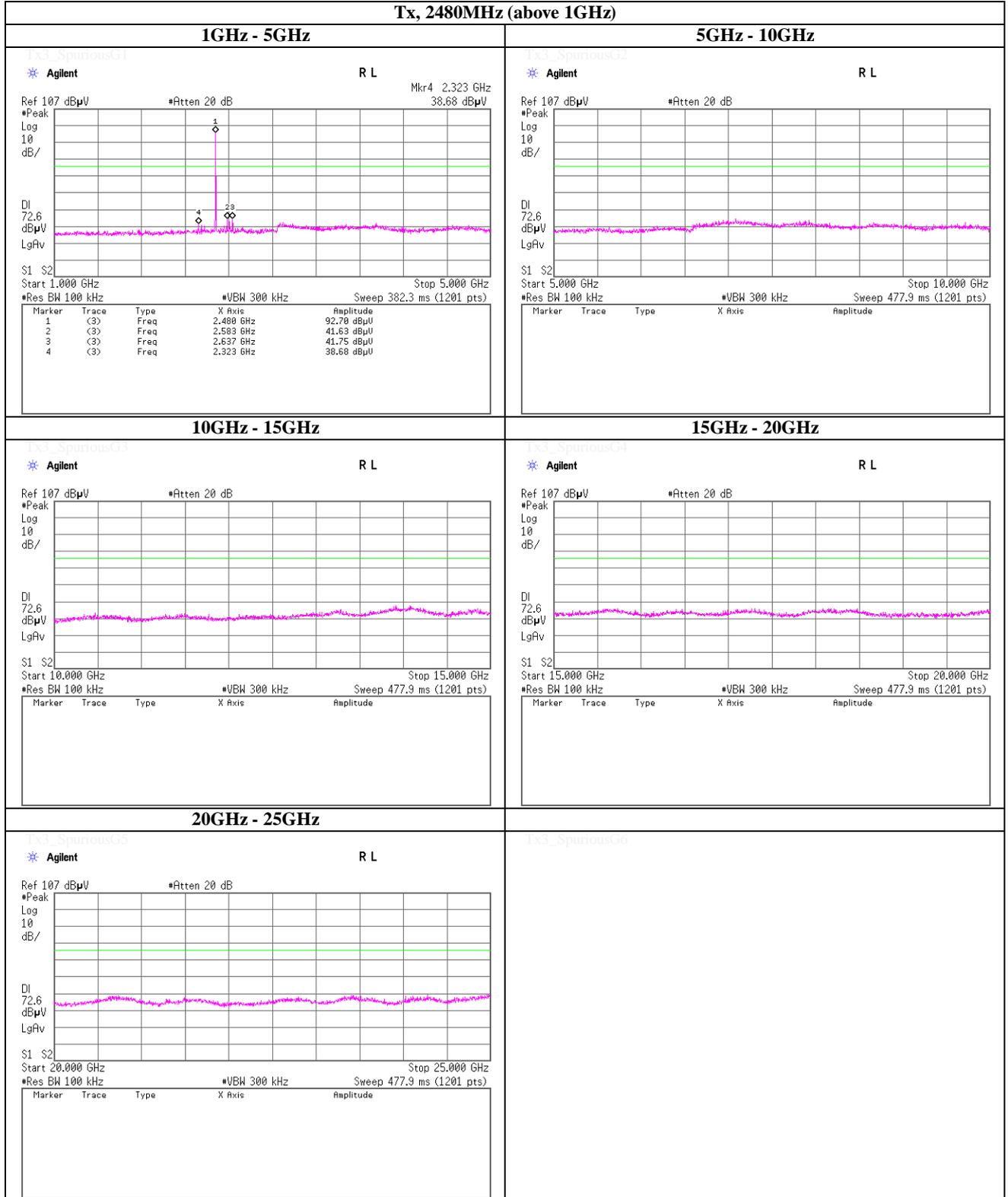
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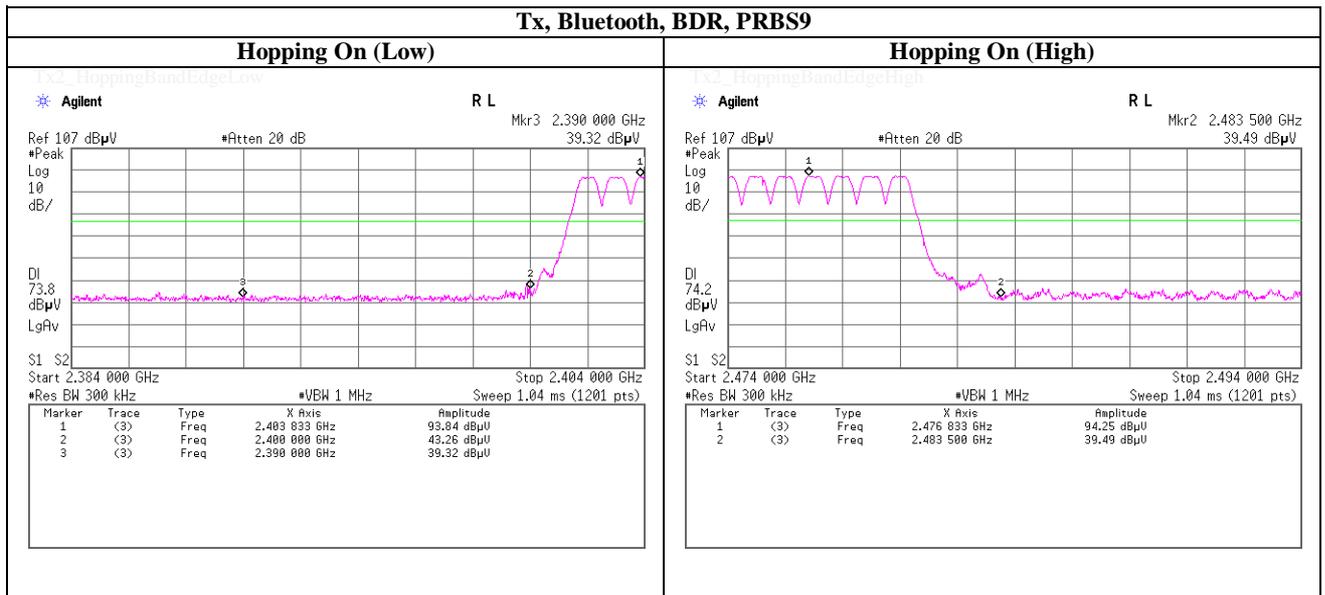
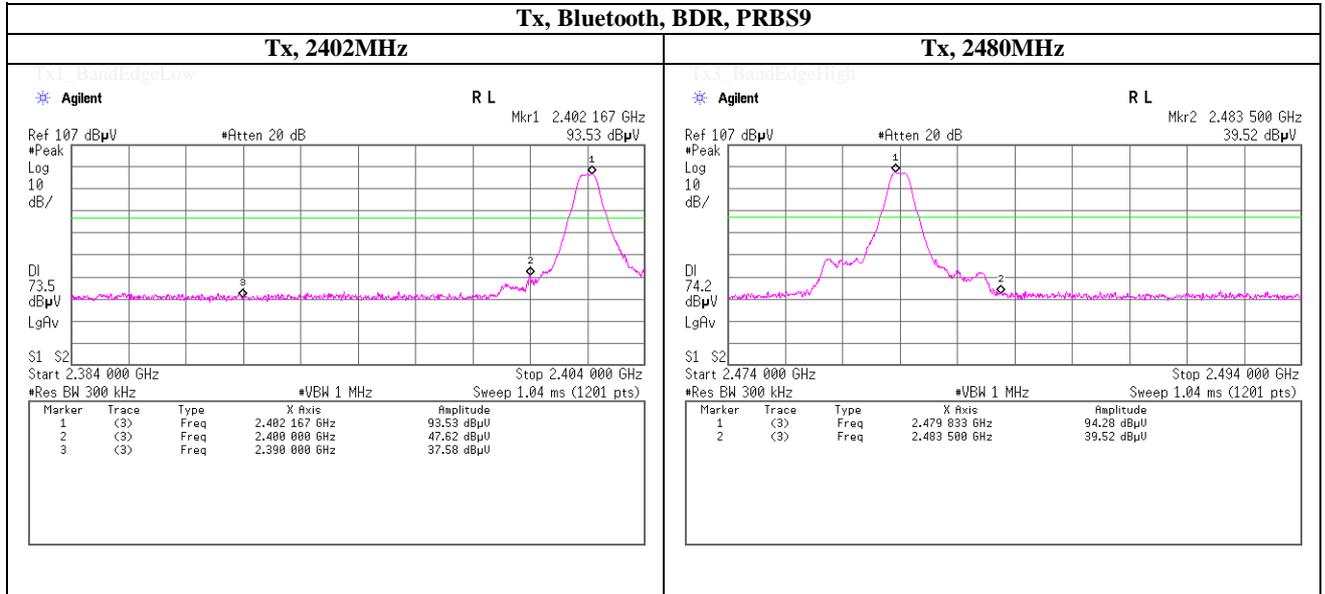
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Spurious emission (Conducted)

Band Edge compliance



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Shonan EMC Lab.

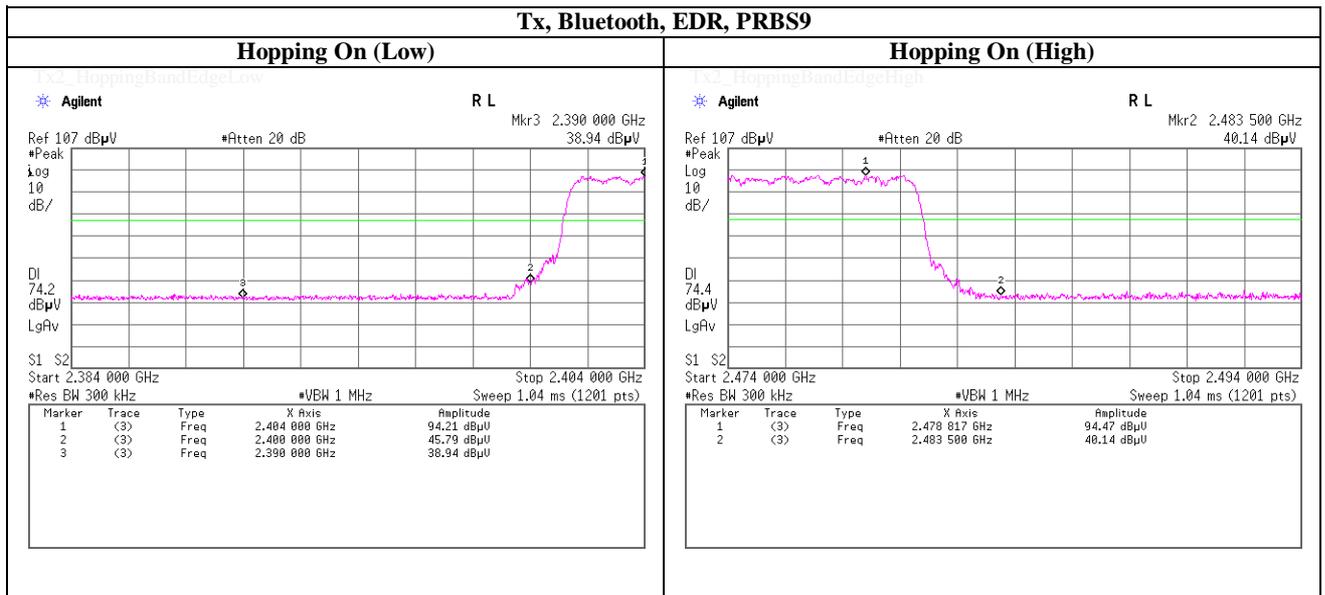
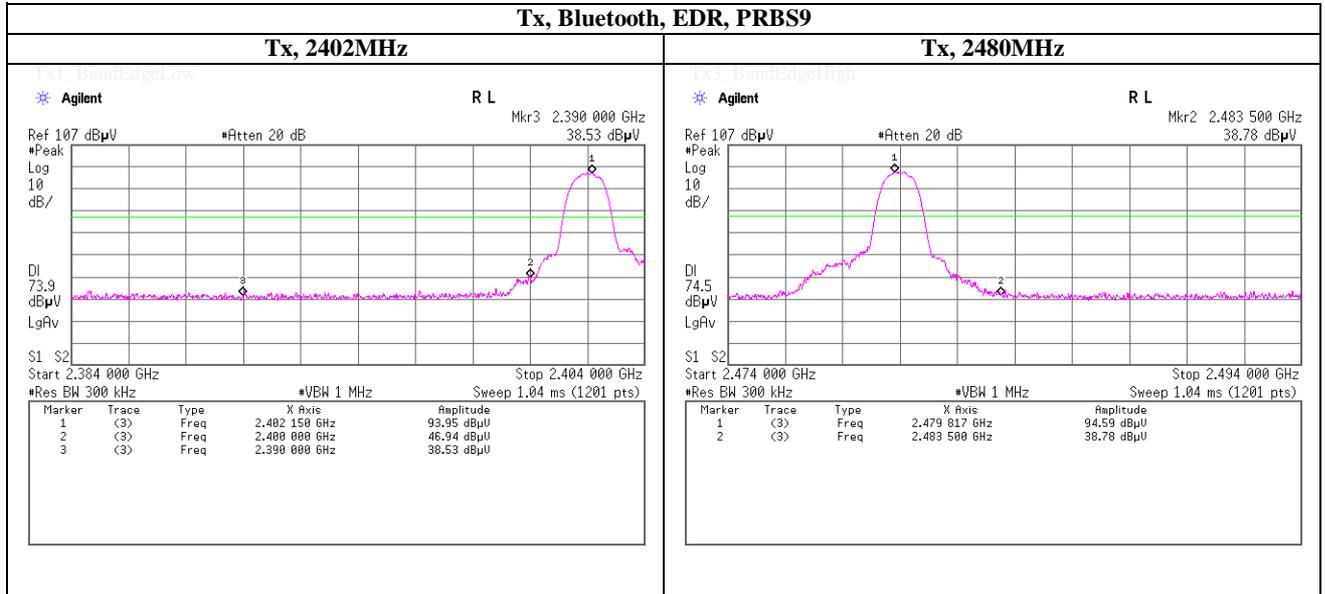
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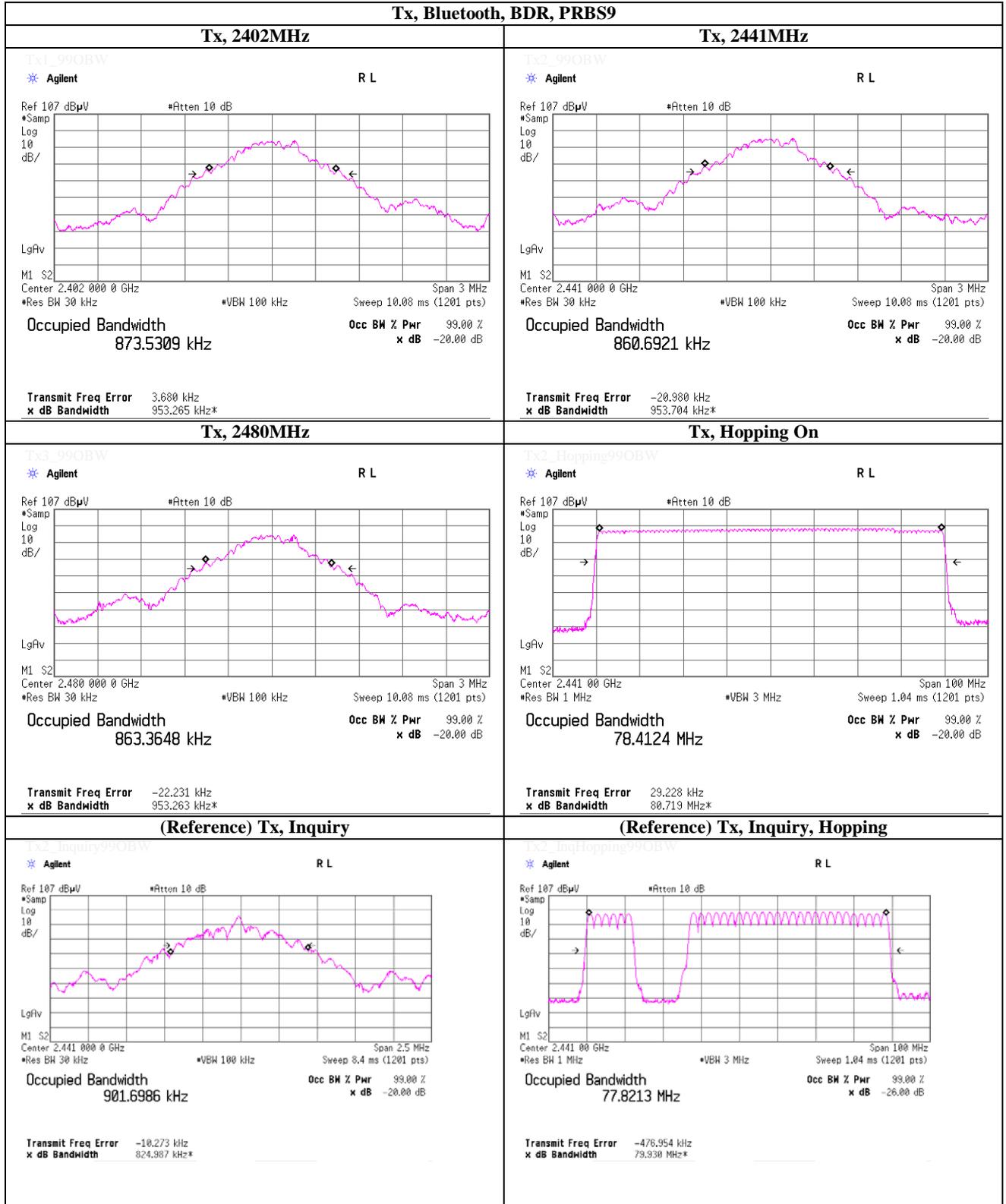
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99% Occupied Bandwidth



UL Japan, Inc.

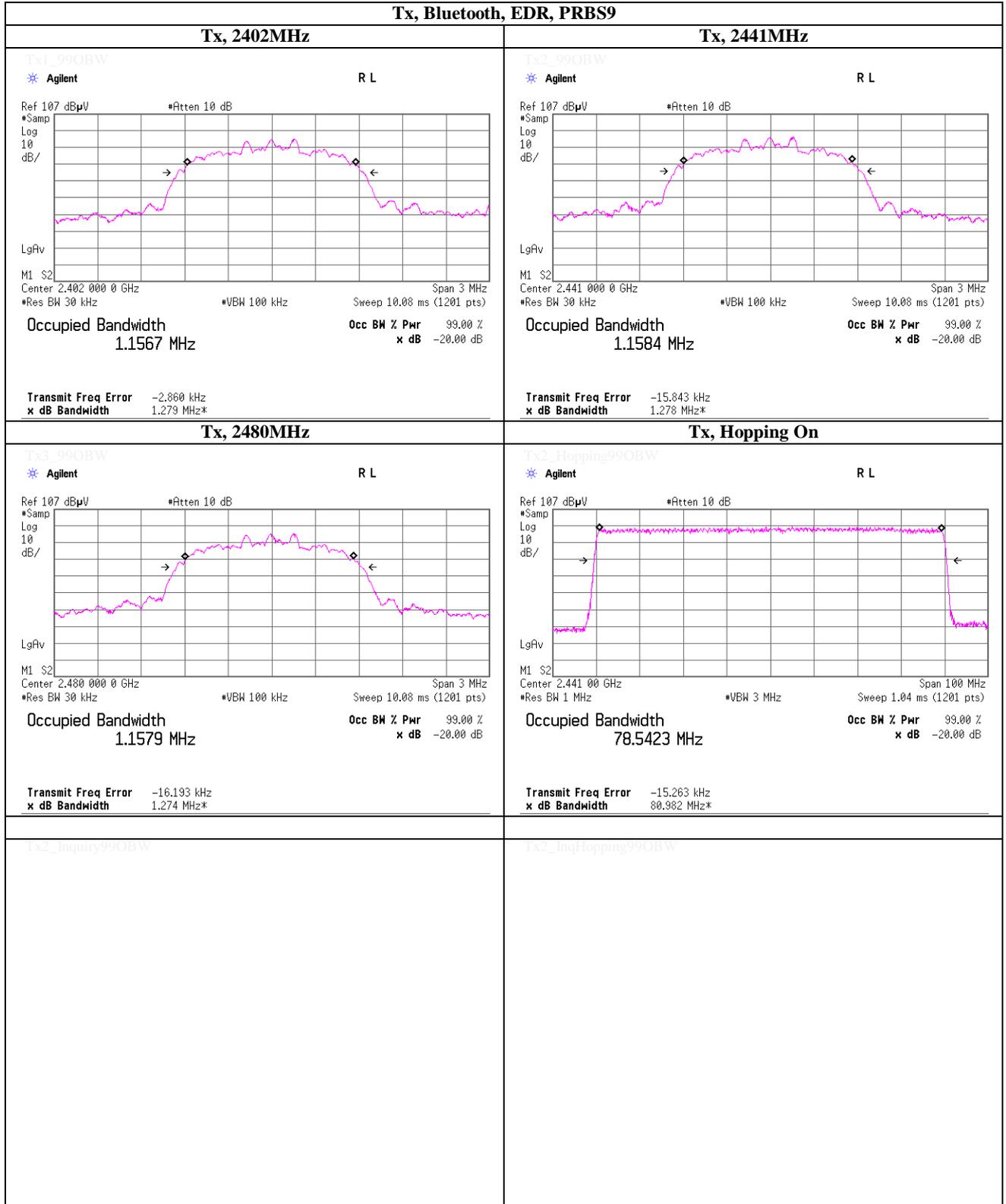
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APPENDIX 2 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2013/01/08 * 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
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2013/03/16 * 12
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2013/04/09 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2013/04/25 * 12
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2013/07/03 * 12
KAF-04	Pre Amplifier	Agilent	8449B	3008A01600	RE	2013/04/03 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2013/04/09 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2013/05/22 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2013/08/12 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2013/02/27 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2012/10/04 * 12
SJM-08	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE	-
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2012/12/18 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2013/03/14 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2013/03/19 * 12
SCC-G18	Coaxial Cable	Suhner	SUCOFLEX 104A	46292/4A	RE	2013/03/16 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2013/02/12 * 12
SAT6-05	Attenuator	JFW	50HF-006N	-	RE	2013/02/12 * 12
KAT3-09	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2013/08/23 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2013/10/13 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2013/04/04 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2013/04/04 * 12
KLA-06	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	125	RE	2012/11/18 * 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 :

RE: Out of Band Emission (Radiated)

AT: Antenna terminal conducted test