



RADIO TEST REPORT

Test Report No.: 32LE0328-SH-01-B

Applicant : PIONEER CORPORATION
Type of Equipment : Car Audio with Bluetooth
Model No. : NXF-9338
FCC ID : AJDK061
Test regulation : FCC Part15 Subpart C: 2012
Test result : Complied

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4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: October 23 to 28, 2012

Tested by: 
Shinichi Takano
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

REVISION HISTORY

Original Test Report No.: 32LE0328-SH-01-B

[illegible]

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Contents

	<u>Page</u>
SECTION 1: Customer information.....	4
SECTION 2: Equipment under test (E.U.T.)	4
SECTION 3: Test specification, procedures & results.....	6
SECTION 4: Operation of E.U.T. during testing.....	9
SECTION 5: Carrier frequency separation.....	12
SECTION 6: 20dB bandwidth & Occupied bandwidth (99%)	12
SECTION 7: Number of hopping frequency	12
SECTION 8: Dwell time	12
SECTION 9: Maximum peak output power	12
SECTION 10: Spurious emissions (Antenna port conducted).....	12
SECTION 11: Radiated emission.....	13
Contents of APPENDIXES.....	15
APPENDIX 1: Data of radio tests	16
APPENDIX 2: Test instruments	49
APPENDIX 3: Photographs of test setup	50

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SECTION 1: Customer information

Company Name : PIONEER CORPORATION
Brand name : Pioneer
Address : 25-1 Aza-Nishi-machi, Yamada, Kawagoe-shi, Saitama, 350-8555, JAPAN
Telephone Number : +81-49-228-6415
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Contact Person : Makoto Kaieda

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

2.1 Identification of E.U.T.

Type of Equipment : Car Audio with Bluetooth
Model No. : NXF-9338
Serial No. : See Section 4.
Rating : DC 13.2V
Country of Mass-production : Japan
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.
Receipt Date of Sample : October 10, 2012

2.2 Product description

Model: NXF-9338 (referred to as the EUT in this report) is a Car Audio with Bluetooth.

The EUT has a derived model: NXF-9138
Difference is the audio amplifier and the design.

Radio specification:

Bluetooth:

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth & channel spacing : 79MHz & 1MHz
Type of modulation : GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna type : Ceramic patch antenna
Antenna gain with cable loss : +2dBi (max)
Antenna connector type : MHF series micro coaxial connector receptacle vertical
Operation temperature range : -20 to +65 deg.C.

Wireless LAN:

Equipment type : Transceiver
Frequency of operation : 2412-2462MHz
Bandwidth & channel spacing : 20MHz & 5MHz
Type of modulation : BPSK, QPSK, CCK, 16QAM, 64QAM
Antenna type : Ceramic patch antenna
Antenna gain with cable loss : +2dBi (max)
Antenna connector type : MHF series micro coaxial connector receptacle vertical
Operation temperature range : 20 to +65 deg.C.

Refer to the test report: 32LE0328-SH-01-A for Wireless LAN part.

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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 this requirement since this antenna is built in the equipment and it cannot be replaced by end users.

Clock Frequency:

Item	Reason For Use	Frequency
Navi Board	NAVI SYSTEM CLOCK	32.4576MHz
	MIC AD (M3:12kHz)	12.288MHz
	PCIe (Oscillator)	100.01MHz
	SATA CLOCK	100.01MHz
	USB (Oscillator)	48MHz
	GPS CLOCK	16.368MHz
	MOST CLOCK	12.288MHz
	DOT CLOCK	33.231MHz
	NTSC CLOCK	27MHz
	GVIF CLOCK	24MHz
	DC-DC CONVERTER	416kHz
	DC-DC CONVERTER	463kHz
	REAL TIME CLOCK	32.768kHz
	RESET CPU CLOCK	4MHz
Audio Board	SYSTEM MICROCOMPUTER	16MHz
	MICROCOMPUTER COMMUNICATION	4MHz
	DC-DC CONVERTER	500kHz
	DC-DC CONVERTER	461kHz
	SUB MICROCOMPUTER	6MHz
	CAN MICROCOMPUTER	8MHz
	A/D CONVERTER	24.576MHz
	DVD MECH.	27MHz
	VIDEO_DAC	108MHz
	SDRAM	121.5MHz
	FM/AM TUNER	74.1MHz
	INTERMEDIATE FREQUENCY	10.7MHz
	XM FRONTEND	1871.004MHz
	XM FRONTEND	467.751MHz
	XM BACKEND	24.265MHz
	XM MICROCOMPUTER	4.7175MHz
Panel Board	PANEL MICROCOMPUTER	9.83MHz
	DC-DC CONVERTER	100kHz
	BLUETOOTH MODULE	26MHz
	BLUETOOTH DIGITAL AUDIO BIT CLOCK	2.086MHz

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SECTION 3: Test specification, procedures & results**3.1 Test specification**

Test specification : Test specification: FCC Part 15 Subpart C: 2012,
final revised on August 13, 2012 and effective September 12, 2012

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

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)	-	N/A
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	6.8dB Freq.: 481.122MHz 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	4.9 dB	5.1 dB	4.9 dB
	300MHz-1GHz	5.0 dB	5.2 dB	4.9 dB
	1GHz-15GHz	4.8 dB	4.8 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.6 dB	4.3 dB	4.4 dB

*1: SAC=Semi-Anechoic Chamber

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

The data listed in this test report has enough 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: (±) 1.7dB

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

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

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

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

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3.5 Test location

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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
☐ No.1 Semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.2 Semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.3 Semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 Semi-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☒ No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

3.6 Test setup, Data of EMI & 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 (DH5/3DH5), Payload: PRBS9	-
20dB bandwidth	Transmitting Hopping OFF (DH5/3DH5), Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Number of hopping frequency	Transmitting Hopping ON (DH5/3DH5), Payload: PRBS9	-
Dwell time	Transmitting (Hopping ON), Payload: PRBS9 -DH1, -DH3, -DH5 -3DH1, -3DH3, -3DH5	-
Maximum peak output power	Transmitting (Hopping OFF), Payload: PRBS9 -DH5, -2DH5, -3DH5	2402MHz, 2441MHz, 2480MHz
Band edge compliance & Spurious emission (Conducted)	Transmitting (DH5/3DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	Band edge compliance: 2402MHz, 2480MHz
(Radiated)	Transmitting (DH5/3DH5), Payload: PRBS9	Spurious emission: 2402MHz, 2441MHz, 2480MHz
99% occupied bandwidth	Transmitting (DH5/3DH5), Payload: PRBS9 -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.

*EUT has the power settings by the software as follows;

Power settings: Power target: 0 (dBm)
BDR: Ext.=0, Int.=47
EDR: Ext.=0, Int.=47
Software: BlueTest3.exe Version 2.4

The EUT does not have Inquiry mode.

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

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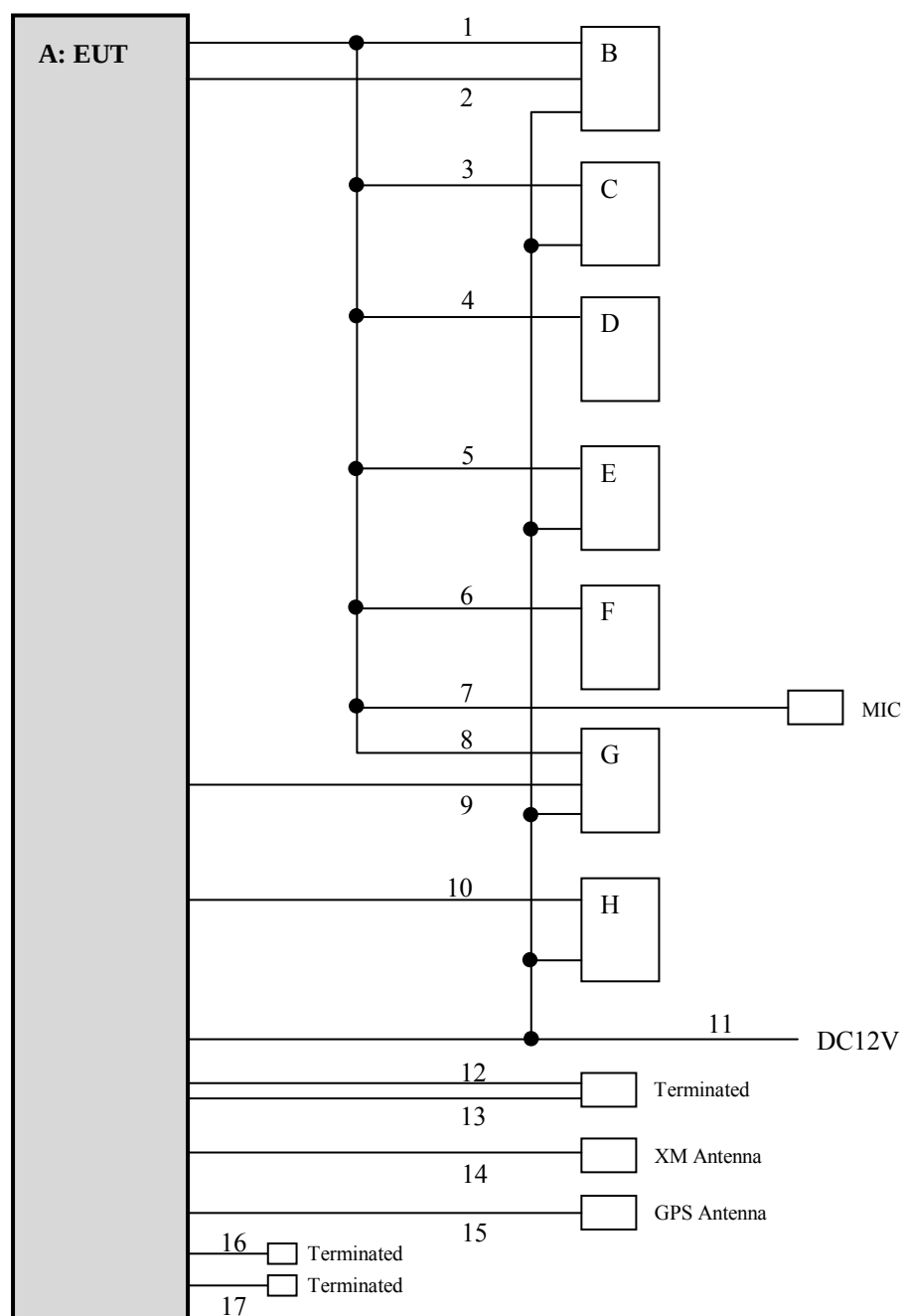
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4.2 Configuration of tested system



* Test data was taken under worse case conditions.

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Car Audio with Bluetooth	NXF-9338	*1)	Pioneer	EUT
B	Display	86110-30330	329003456	DENSO	-
C	Remote Control Device	84780-30080	0244AA	-	-
D	Steering Switch	-	-	-	-
E	Air-Condition ECU	88650-30P80	177700-6524	DENSO	-
F	Rear Camera	-	-	-	-
G	DCM	86741-53040	A1000004900E70	DENSO	-
H	Amplifier	86280-53190	LVD:K1LD014	Pioneer	-

*1) Antenna terminal conducted tests: AAB999999US, Radiated emission tests: AAB999998US

List of cables used

No.	Cable name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal cable for Display	2.0	Unshielded	Unshielded	-
2	Image output cable	2.0	Unshielded	Unshielded	-
3	Signal cable for Remote control	2.0	Unshielded	Unshielded	-
4	Signal cable for Steering Switch	2.0	Unshielded	Unshielded	-
5	Signal cable for Air-Condition ECU	2.0	Unshielded	Unshielded	-
6	Signal cable for Rear Camera	2.0	Unshielded	Unshielded	-
7	Signal cable for MIC	4.0	Shielded	Shielded	-
8	Signal cable for DCM	2.0	Unshielded	Unshielded	-
9	Signal cable for DCM	1.2	Unshielded	Unshielded	-
10	Signal cable for Amplifier	2.0	Shielded	Shielded	-
11	DC power cable	4.0	Unshielded	Unshielded	-
12	AV cable	2.0	Unshielded	Unshielded	-
13	USB cable	2.0	Shielded	Shielded	-
14	Antenna cable for XM	2.4	Shielded	Shielded	-
15	Antenna cable for GPS	1.6	Shielded	Shielded	-
16	Antenna cable for Radio	0.15	Shielded	Shielded	-
17	Antenna cable for Radio	0.15	Shielded	Shielded	-

*All cables used for the measurement are exclusive use or marketed.

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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

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

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

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

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

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

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SECTION 11: Radiated emission

11.1 Operating environment

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

11.2 Test configuration

EUT was placed on a platform of nominal size, 1m 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.

11.3 Test conditions

Frequency range : 30MHz to 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 of the test receiver.

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 fixed at angle of 23.5 deg. based on the product specification.

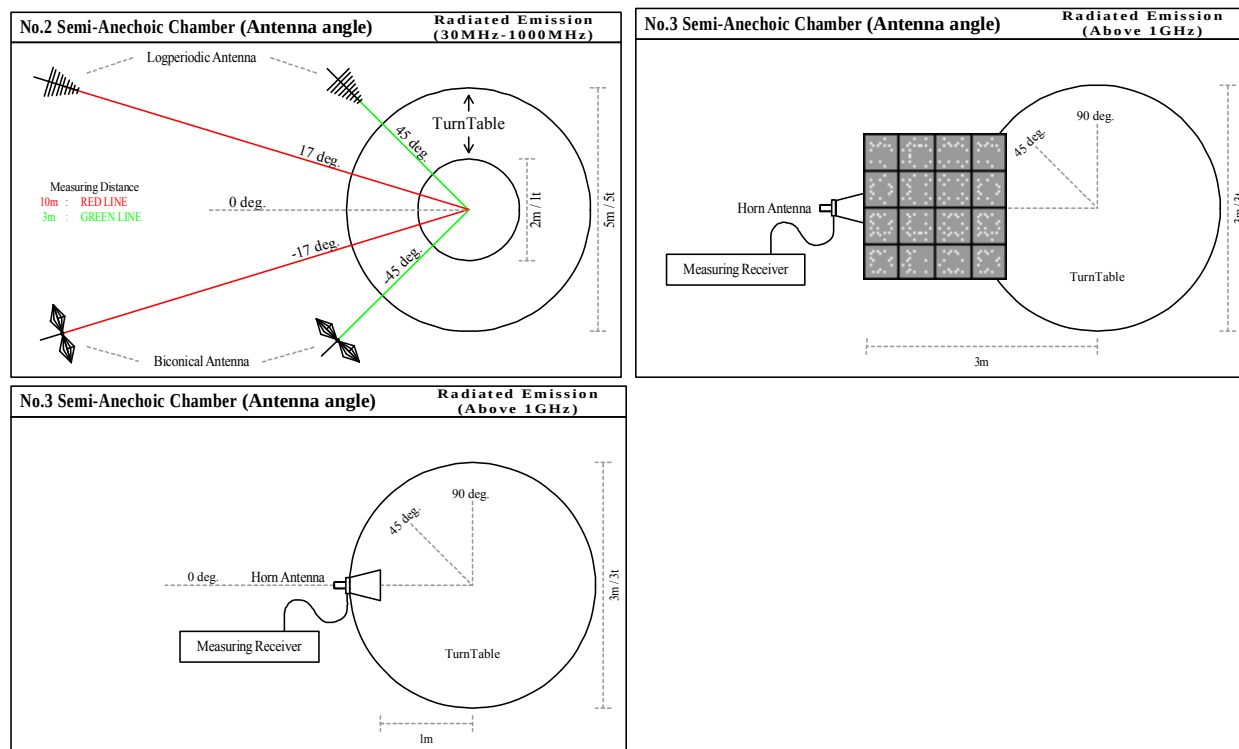
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Figure 1. Antenna angle

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

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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	October 23, 2012	October 24, 2012
Temperature / Humidity	25deg.C , 55%RH	24deg.C , 52%RH
Engineer	Tatsuya Arai	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	0.944	1.000	>= 0.630
DH5	2441.0	0.940	1.000	>= 0.627
DH5	2480.0	0.943	1.000	>= 0.629

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

No limit applies to 20dB Bandwidth.

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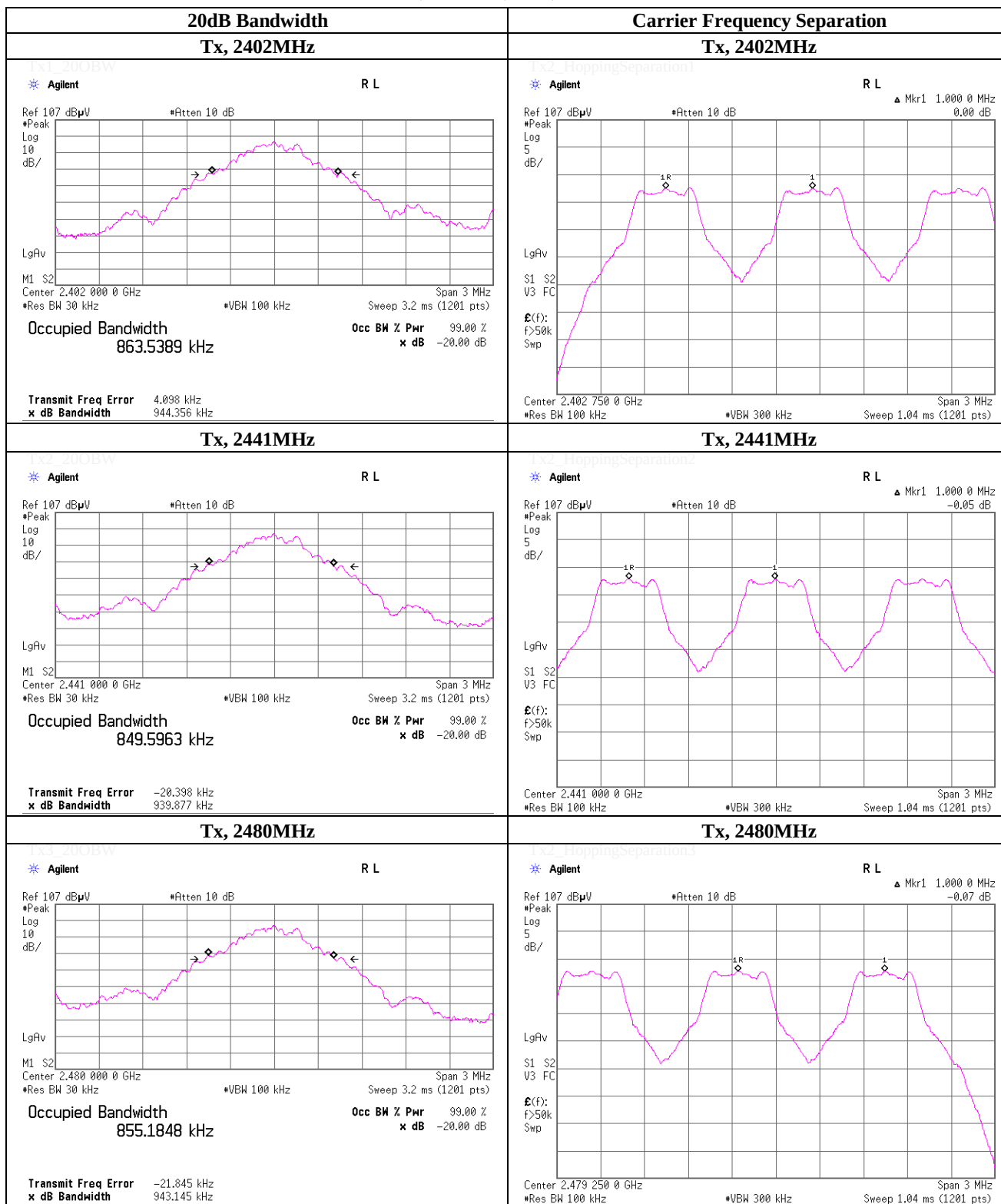
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9



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20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 23, 2012	October 24, 2012
Temperature / Humidity	25deg.C , 55%RH	24deg.C , 52%RH
Engineer	Tatsuya Arai	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	1.263	1.000	>= 0.842
3-DH5	2441.0	1.261	1.000	>= 0.841
3-DH5	2480.0	1.261	1.000	>= 0.840

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

No limit applies to 20dB Bandwidth.

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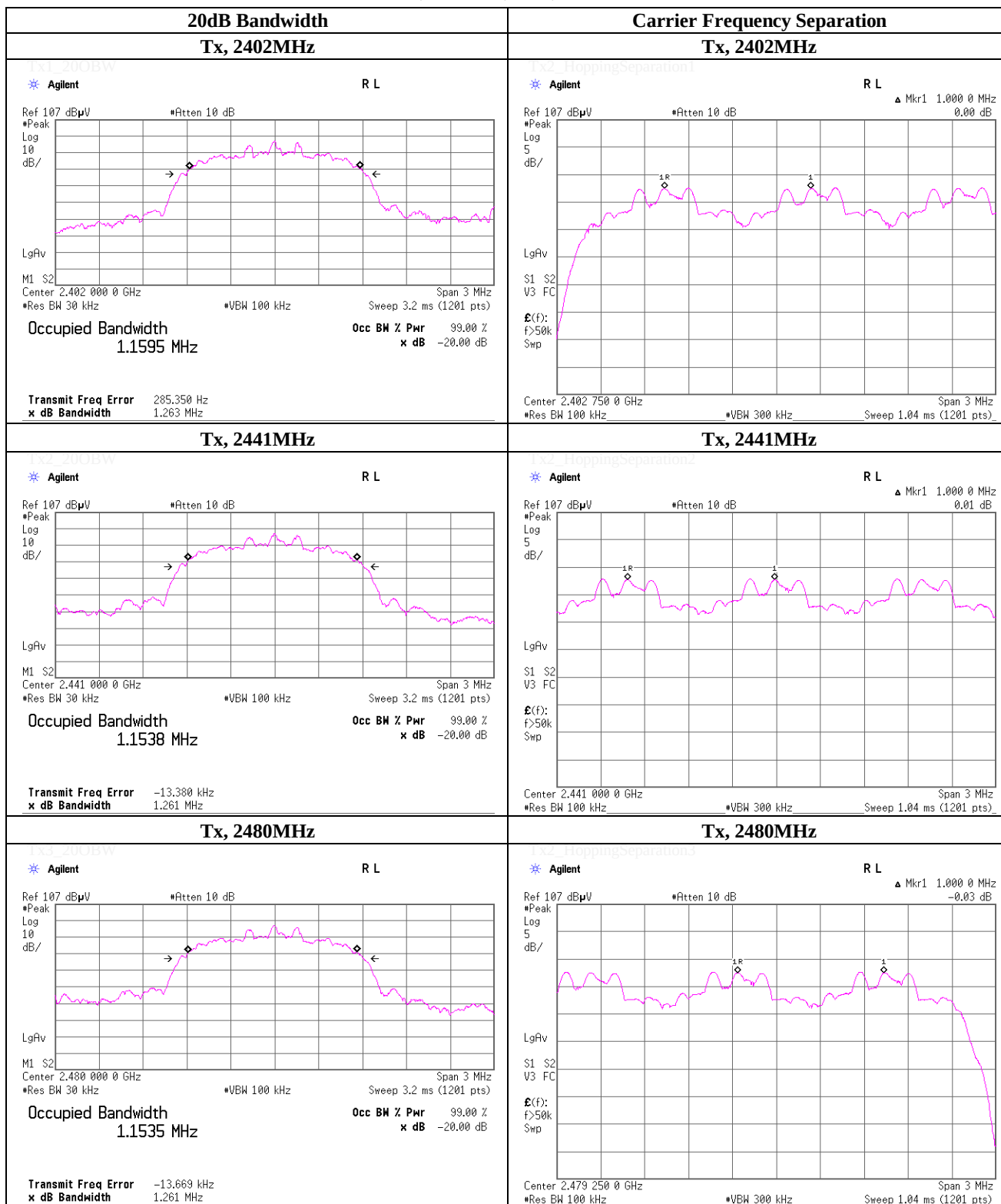
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



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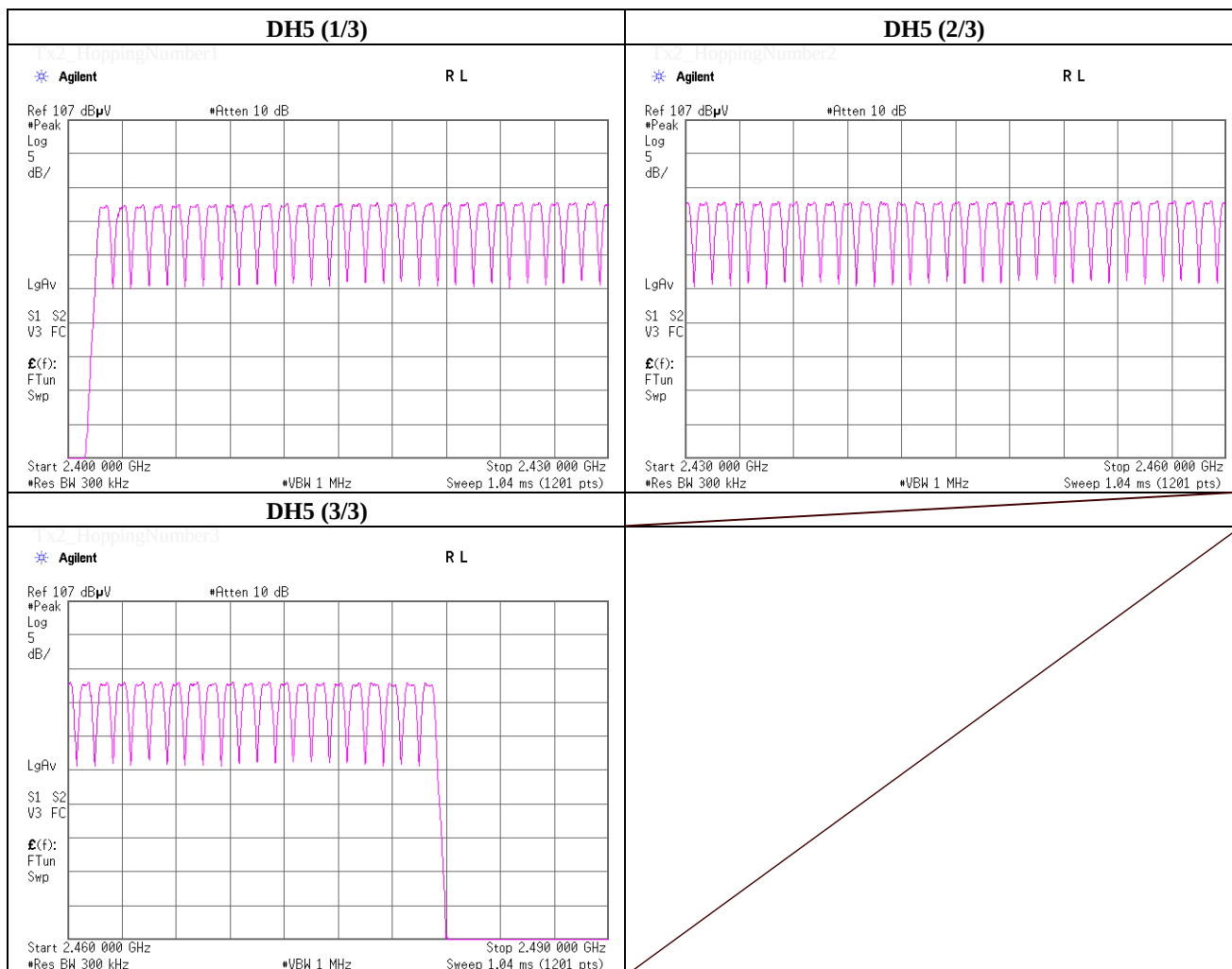
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Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 24, 2012	
Temperature / Humidity	24deg.C , 52%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.



UL Japan, Inc.

Shonan EMC Lab.

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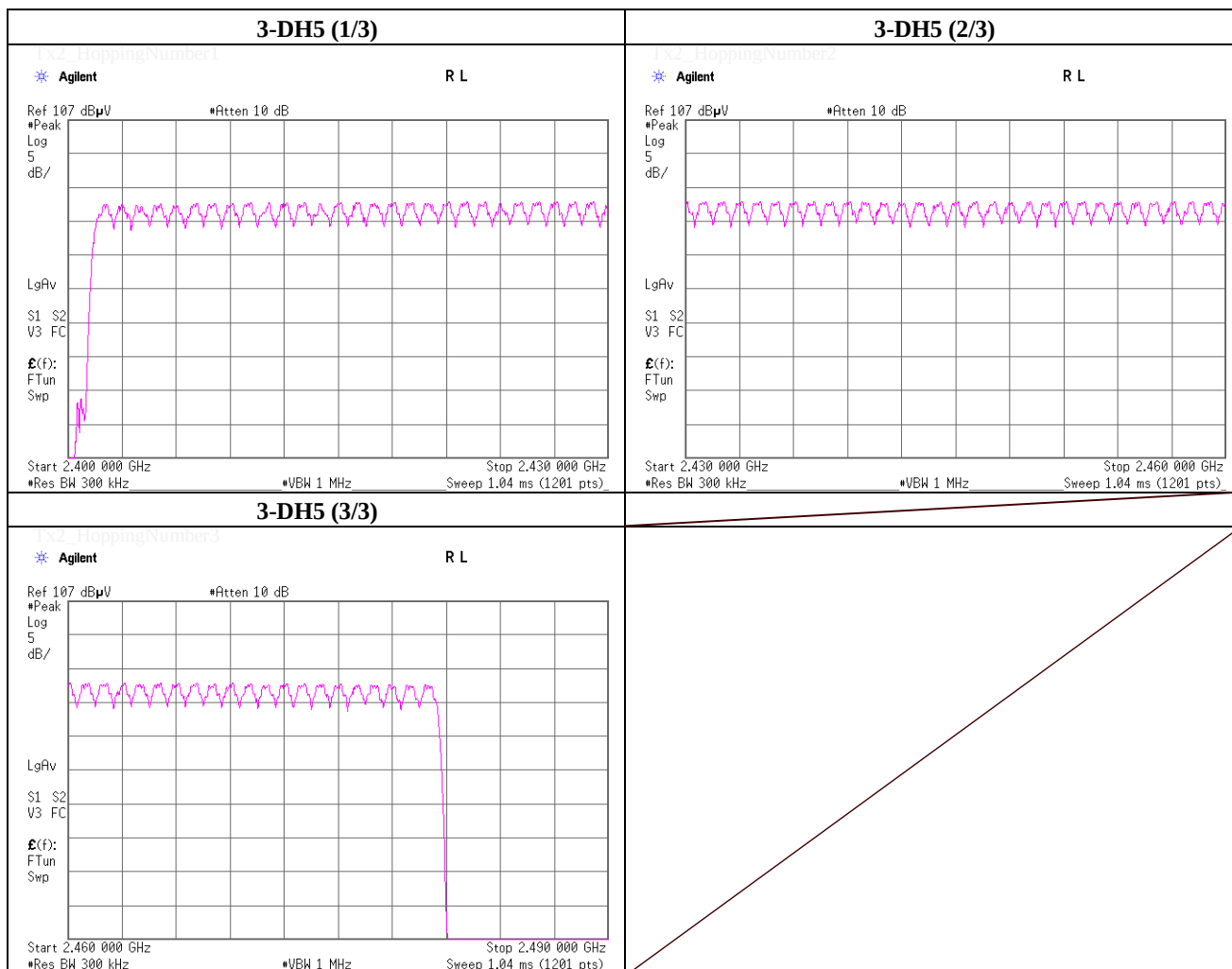
Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 24, 2012	
Temperature / Humidity	24deg.C , 52%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.



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date October 24, 2012
 Temperature / Humidity 24deg.C , 52%RH
 Engineer Tatsuya Arai
 Mode Tx, Bluetooth, BDR, PRBS9

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4)	Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	51.0 / 5.0 sec. x 31.6 sec. = 323 times	0.400	129	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.656	273	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.903	314	400

Sample Calculation

Result = Number of transmission x Length of transmission time

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

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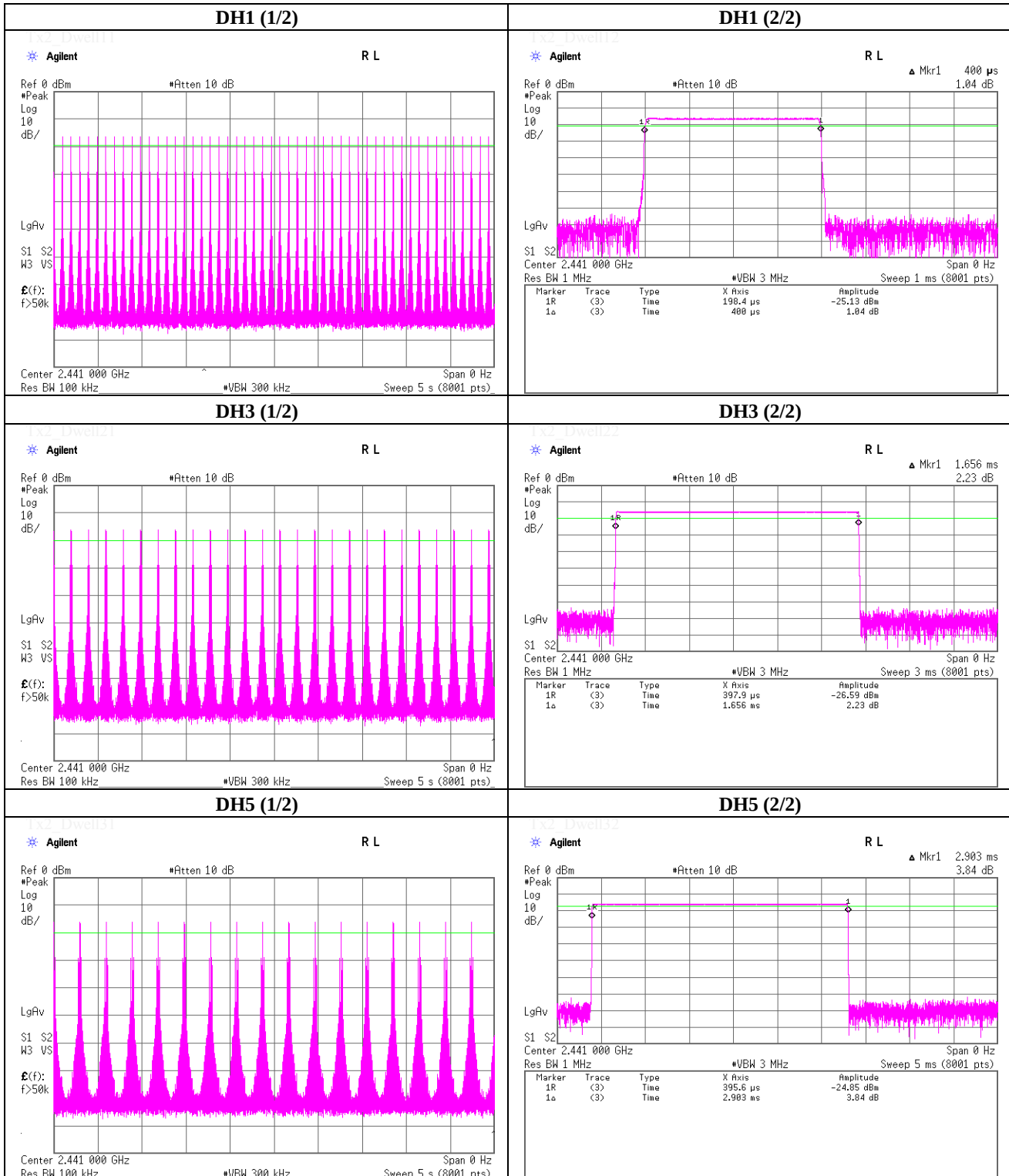
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Dwell time

Tx, Bluetooth, BDR, PRBS9



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Dwell Time

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	October 24, 2012	
Temperature / Humidity	24deg.C , 52%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	0.409	132	400
3-DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.659	274	400
3-DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.910	314	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.

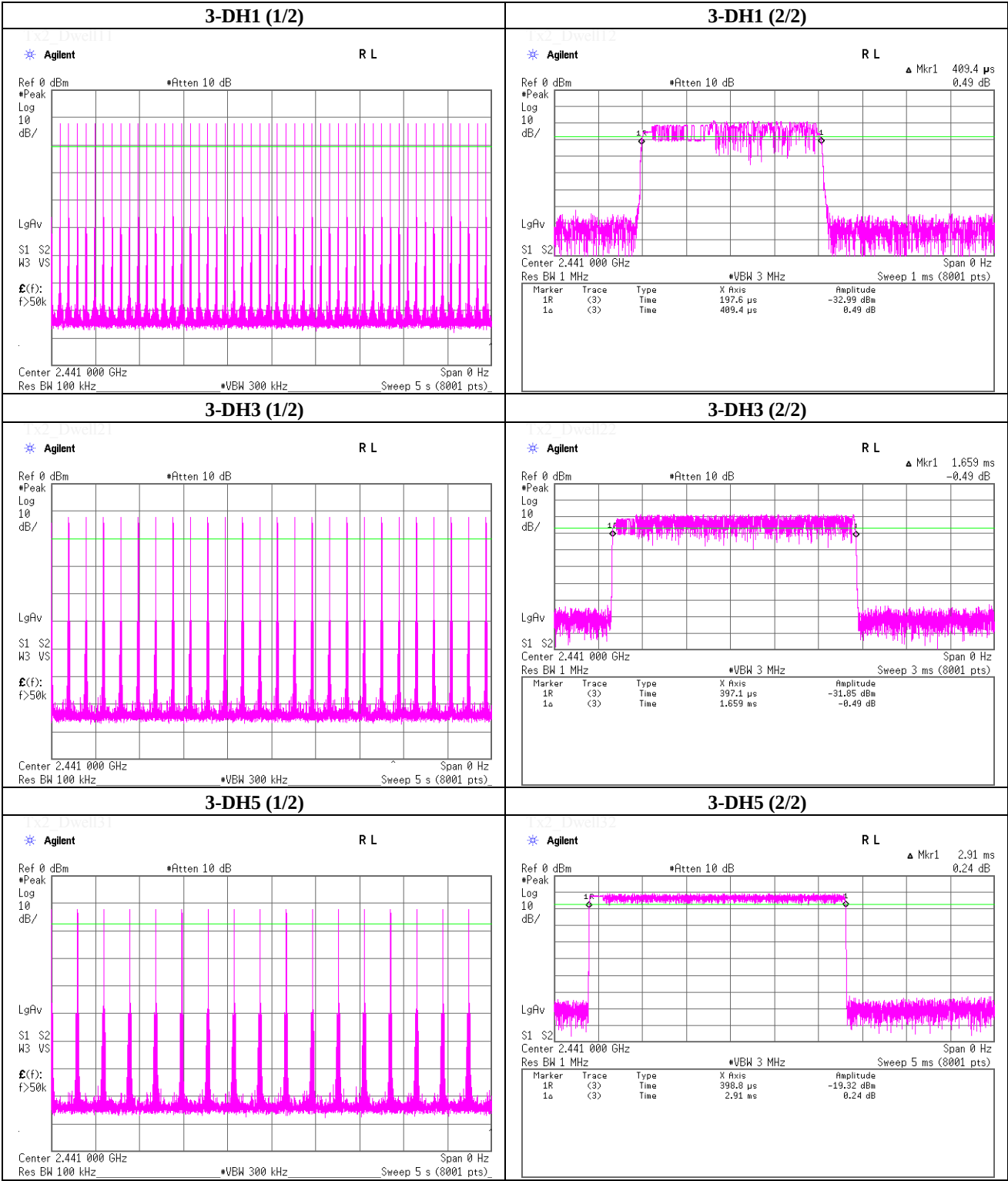
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Dwell time

Tx, Bluetooth, EDR, PRBS9



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Maximum Peak Conducted Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date October 23, 2012
 Temperature / Humidity 25deg.C , 55%RH
 Engineer Tatsuya Arai
 Mode Tx, Bluetooth

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

	Freq.	P/M (Peak)	Cable	Atten.	Result		Limit		Margin
	[MHz]	Reading [dBm]	Loss [dB]	Loss [dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-12.20	1.44	10.00	-0.76	0.84	20.97	125	21.73
DH5	2441.0	-11.44	1.45	10.00	0.01	1.00	20.97	125	20.96
DH5	2480.0	-11.49	1.46	10.00	-0.03	0.99	20.97	125	21.00
2-DH5	2402.0	-10.82	1.44	10.00	0.62	1.15	20.97	125	20.35
2-DH5	2441.0	-10.35	1.45	10.00	1.10	1.29	20.97	125	19.87
2-DH5	2480.0	-10.46	1.46	10.00	1.00	1.26	20.97	125	19.97
3-DH5	2402.0	-10.41	1.44	10.00	1.03	1.27	20.97	125	19.94
3-DH5	2441.0	-10.05	1.45	10.00	1.40	1.38	20.97	125	19.57
3-DH5	2480.0	-10.13	1.46	10.00	1.33	1.36	20.97	125	19.64

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	No.2 Semi Anechoic Chamber
Date	October 26, 2012	October 28, 2012
Temperature / Humidity	27 deg.C , 39 %RH	24 deg.C , 36 %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.	407.107	QP	44.6	16.5	7.6	31.7	37.0	46.0	9.0	100	29	
Hori.	472.526	QP	43.8	17.1	8.0	31.7	37.2	46.0	8.8	100	257	
Hori.	481.124	QP	45.6	17.1	8.1	31.7	39.1	46.0	6.9	258	36	
Hori.	1776.450	PK	48.6	25.9	13.5	41.0	47.0	73.9	26.9	100	264	
Hori.	2390.000	PK	47.5	27.4	14.2	41.4	47.7	73.9	26.2	227	359	
Hori.	2400.000	PK	53.3	27.4	14.2	41.4	53.5	73.9	20.4	227	359	
Hori.	2557.984	PK	47.2	27.7	14.3	41.4	47.8	73.9	26.1	205	321	
Hori.	2886.715	PK	53.1	28.2	6.2	41.4	46.1	73.9	27.8	100	148	
Hori.	3330.812	PK	53.0	29.0	5.6	41.7	45.9	73.9	28.0	100	258	
Hori.	4804.000	PK	50.1	31.1	6.8	41.2	46.8	73.9	27.1	114	232	
Hori.	7206.000	PK	46.3	36.6	8.3	41.4	49.8	73.9	24.1	100	0	
Hori.	9608.000	PK	43.2	38.5	9.4	38.9	52.2	73.9	21.7	100	0	
Hori.	12010.000	PK	43.4	39.4	10.7	39.4	54.1	73.9	19.8	100	0	
Hori.	1776.450	AV	38.9	25.9	13.5	41.0	37.3	53.9	16.6	100	264	
Hori.	2390.000	AV	34.5	27.4	14.2	41.4	34.7	53.9	19.2	227	359	
Hori.	2400.000	AV	38.3	27.4	14.2	41.4	38.5	53.9	15.4	227	359	
Hori.	2557.984	AV	37.5	27.7	14.3	41.4	38.1	53.9	15.8	205	321	
Hori.	2886.715	AV	44.2	28.2	6.2	41.4	37.2	53.9	16.7	100	148	
Hori.	3330.812	AV	48.0	29.0	5.6	41.7	40.9	53.9	13.0	100	258	
Hori.	4804.000	AV	41.3	31.1	6.8	41.2	38.0	53.9	15.9	114	232	
Hori.	7206.000	AV	35.4	36.6	8.3	41.4	38.9	53.9	15.0	100	0	
Hori.	9608.000	AV	31.8	38.5	9.4	38.9	40.8	53.9	13.1	100	0	
Hori.	12010.000	AV	33.2	39.4	10.7	39.4	43.9	53.9	10.0	100	0	
Vert.	55.499	QP	31.3	9.2	7.2	31.9	15.8	40.0	24.2	100	241	
Vert.	491.566	QP	37.4	17.2	8.1	31.7	31.0	46.0	15.0	148	1	
Vert.	592.146	QP	38.9	19.1	8.7	31.7	35.0	46.0	11.0	100	221	
Vert.	779.022	QP	34.0	20.7	9.5	31.5	32.7	46.0	13.3	100	0	
Vert.	1776.521	PK	49.6	25.9	13.5	41.0	48.0	73.9	25.9	100	194	
Vert.	2390.000	PK	47.1	27.4	14.2	41.4	47.3	73.9	26.6	100	59	
Vert.	2400.000	PK	50.4	27.4	14.2	41.4	50.6	73.9	23.3	100	59	
Vert.	2557.980	PK	47.0	27.7	14.3	41.4	47.6	73.9	26.3	109	54	
Vert.	2886.737	PK	55.1	28.2	6.2	41.4	48.1	73.9	25.8	100	240	
Vert.	3330.808	PK	54.7	29.0	5.6	41.7	47.6	73.9	26.3	100	172	
Vert.	4804.000	PK	48.3	31.1	6.8	41.2	45.0	73.9	28.9	100	240	
Vert.	7206.000	PK	47.4	36.6	8.3	41.4	50.9	73.9	23.0	100	0	
Vert.	9608.000	PK	43.1	38.5	9.4	38.9	52.1	73.9	21.8	100	0	
Vert.	12010.000	PK	44.8	39.4	10.7	39.4	55.5	73.9	18.4	100	0	
Vert.	1776.521	AV	39.6	25.9	13.5	41.0	38.0	53.9	15.9	100	194	
Vert.	2390.000	AV	34.4	27.4	14.2	41.4	34.6	53.9	19.3	100	59	
Vert.	2400.000	AV	35.8	27.4	14.2	41.4	36.0	53.9	17.9	100	59	
Vert.	2557.980	AV	36.2	27.7	14.3	41.4	36.8	53.9	17.1	109	54	
Vert.	2886.737	AV	46.4	28.2	6.2	41.4	39.4	53.9	14.5	100	240	
Vert.	3330.808	AV	50.5	29.0	5.6	41.7	43.4	53.9	10.5	100	172	
Vert.	4804.000	AV	38.4	31.1	6.8	41.2	35.1	53.9	18.8	100	240	
Vert.	7206.000	AV	35.7	36.6	8.3	41.4	39.2	53.9	14.7	100	0	
Vert.	9608.000	AV	32.1	38.5	9.4	38.9	41.1	53.9	12.8	100	0	
Vert.	12010.000	AV	33.1	39.4	10.7	39.4	43.8	53.9	10.1	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

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

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	October 26, 2012	October 28, 2012
Temperature / Humidity	27 deg.C , 39 %RH	24 deg.C , 36 %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.	55.519	QP	32.4	9.2	7.2	31.9	16.9	40.0	23.1	400	247	
Hori.	407.095	QP	44.1	16.5	7.6	31.7	36.5	46.0	9.5	100	34	
Hori.	450.010	QP	39.6	16.9	7.9	31.7	32.7	46.0	13.3	100	358	
Hori.	481.122	QP	45.8	17.1	8.0	31.7	39.2	46.0	6.8	273	32	
Hori.	518.135	QP	43.7	17.7	8.3	31.7	38.0	46.0	8.0	100	28	
Hori.	1776.422	PK	49.0	25.9	13.5	41.0	47.4	73.9	26.5	100	265	
Hori.	2597.032	PK	48.5	27.7	14.4	41.4	49.2	73.9	24.7	100	197	
Hori.	2886.730	PK	53.4	28.2	6.2	41.4	46.4	73.9	27.5	100	148	
Hori.	3330.822	PK	53.4	29.0	5.6	41.7	46.3	73.9	27.6	100	260	
Hori.	4882.000	PK	50.8	31.3	6.9	41.1	47.9	73.9	26.0	112	189	
Hori.	7323.000	PK	47.2	36.6	8.6	41.4	51.0	73.9	22.9	100	0	
Hori.	9764.000	PK	43.9	38.7	9.5	38.9	53.2	73.9	20.7	100	0	
Hori.	12205.000	PK	45.5	39.5	10.8	39.3	56.5	73.9	17.4	100	0	
Hori.	1776.422	AV	38.8	25.9	13.5	41.0	37.2	53.9	16.7	100	265	
Hori.	2597.032	AV	37.5	27.7	14.4	41.4	38.2	53.9	15.7	100	197	
Hori.	2886.730	AV	44.5	28.2	6.2	41.4	37.5	53.9	16.4	100	148	
Hori.	3330.822	AV	48.2	29.0	5.6	41.7	41.1	53.9	12.8	100	260	
Hori.	4882.000	AV	41.5	31.3	6.9	41.1	38.6	53.9	15.3	112	189	
Hori.	7323.000	AV	35.9	36.6	8.6	41.4	39.7	53.9	14.2	100	0	
Hori.	9764.000	AV	32.5	38.7	9.5	38.9	41.8	53.9	12.1	100	0	
Hori.	12205.000	AV	33.9	39.5	10.8	39.3	44.9	53.9	9.0	100	0	
Vert.	592.150	QP	38.6	19.1	8.7	31.7	34.7	46.0	11.3	100	216	
Vert.	1776.432	PK	49.7	25.9	13.5	41.0	48.1	73.9	25.8	100	190	
Vert.	2596.926	PK	48.3	27.7	14.4	41.4	49.0	73.9	24.9	109	26	
Vert.	2886.743	PK	55.3	28.2	6.2	41.4	48.3	73.9	25.6	100	241	
Vert.	3330.835	PK	55.6	29.0	5.6	41.7	48.5	73.9	25.4	100	173	
Vert.	4882.000	PK	47.8	31.3	6.9	41.1	44.9	73.9	29.0	103	307	
Vert.	7323.000	PK	47.8	36.6	8.6	41.4	51.6	73.9	22.3	100	0	
Vert.	9764.000	PK	44.2	38.7	9.5	38.9	53.5	73.9	20.4	100	0	
Vert.	12205.000	PK	45.8	39.5	10.8	39.3	56.8	73.9	17.1	100	0	
Vert.	1776.432	AV	39.9	25.9	13.5	41.0	38.3	53.9	15.6	100	190	
Vert.	2596.926	AV	37.8	27.7	14.4	41.4	38.5	53.9	15.4	109	26	
Vert.	2886.743	AV	46.5	28.2	6.2	41.4	39.5	53.9	14.4	100	241	
Vert.	3330.835	AV	51.5	29.0	5.6	41.7	44.4	53.9	9.5	100	173	
Vert.	4882.000	AV	38.4	31.3	6.9	41.1	35.5	53.9	18.4	103	307	
Vert.	7323.000	AV	36.0	36.6	8.6	41.4	39.8	53.9	14.1	100	0	
Vert.	9764.000	AV	32.6	38.7	9.5	38.9	41.9	53.9	12.0	100	0	
Vert.	12205.000	AV	33.8	39.5	10.8	39.3	44.8	53.9	9.1	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$ **UL Japan, Inc.****Shonan EMC Lab.**

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	October 26, 2012	October 28, 2012
Temperature / Humidity	27 deg.C , 39 %RH	24 deg.C , 36 %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.	407.099	QP	43.8	16.5	7.6	31.7	36.2	46.0	9.8	100	22	
Hori.	444.107	QP	44.2	16.8	7.9	31.7	37.2	46.0	8.8	100	222	
Hori.	500.009	QP	42.1	17.4	8.3	31.7	36.1	46.0	9.9	100	21	
Hori.	1776.461	PK	48.4	25.9	13.5	41.0	46.8	73.9	27.1	100	266	
Hori.	2323.913	PK	48.2	27.3	14.1	41.4	48.2	73.9	25.7	100	11	
Hori.	2483.500	PK	46.7	27.5	14.3	41.4	47.1	73.9	26.8	262	359	
Hori.	2484.010	PK	46.4	27.5	14.3	41.4	46.8	73.9	27.1	262	359	
Hori.	2636.029	PK	47.8	27.8	14.4	41.4	48.6	73.9	25.3	100	350	
Hori.	2886.713	PK	54.4	28.2	6.2	41.4	47.4	73.9	26.5	100	148	
Hori.	3330.848	PK	53.7	29.0	5.6	41.7	46.6	73.9	27.3	100	258	
Hori.	4960.000	PK	51.4	31.6	6.9	41.0	48.9	73.9	25.0	100	188	
Hori.	7440.000	PK	48.4	36.7	8.8	41.5	52.4	73.9	21.5	100	0	
Hori.	9920.000	PK	45.6	39.0	9.7	38.9	55.4	73.9	18.5	100	0	
Hori.	12400.000	PK	46.7	39.5	10.8	39.3	57.7	73.9	16.2	100	0	
Hori.	1776.461	AV	38.5	25.9	13.5	41.0	36.9	53.9	17.0	100	266	
Hori.	2323.913	AV	35.5	27.3	14.1	41.4	35.5	53.9	18.4	100	11	
Hori.	2483.500	AV	35.2	27.5	14.3	41.4	35.6	53.9	18.3	262	359	
Hori.	2484.010	AV	34.8	27.5	14.3	41.4	35.2	53.9	18.7	262	359	
Hori.	2636.029	AV	36.1	27.8	14.4	41.4	36.9	53.9	17.0	100	350	
Hori.	2886.713	AV	45.0	28.2	6.2	41.4	38.0	53.9	15.9	100	148	
Hori.	3330.848	AV	48.2	29.0	5.6	41.7	41.1	53.9	12.8	100	258	
Hori.	4960.000	AV	42.7	31.6	6.9	41.0	40.2	53.9	13.7	100	188	
Hori.	7440.000	AV	35.5	36.7	8.8	41.5	39.5	53.9	14.4	100	0	
Hori.	9920.000	AV	32.2	39.0	9.7	38.9	42.0	53.9	11.9	100	0	
Hori.	12400.000	AV	33.2	39.5	10.8	39.3	44.2	53.9	9.7	100	0	
Vert.	66.168	QP	33.2	7.1	7.0	31.9	15.4	40.0	24.6	100	228	
Vert.	481.123	QP	43.0	17.1	8.0	31.7	36.4	46.0	9.6	133	256	
Vert.	592.153	QP	38.9	19.1	8.7	31.7	35.0	46.0	11.0	100	217	
Vert.	1776.423	PK	49.8	25.9	13.5	41.0	48.2	73.9	25.7	100	190	
Vert.	2323.954	PK	48.6	27.3	14.1	41.4	48.6	73.9	25.3	115	54	
Vert.	2483.500	PK	46.5	27.5	14.3	41.4	46.9	73.9	27.0	106	305	
Vert.	2484.050	PK	46.8	27.5	14.3	41.4	47.2	73.9	26.7	106	305	
Vert.	2636.018	PK	47.2	27.8	14.4	41.4	48.0	73.9	25.9	100	25	
Vert.	2886.743	PK	55.9	28.2	6.2	41.4	48.9	73.9	25.0	100	241	
Vert.	3330.810	PK	55.6	29.0	5.6	41.7	48.5	73.9	25.4	100	172	
Vert.	4960.000	PK	51.3	31.6	6.9	41.0	48.8	73.9	25.1	180	54	
Vert.	7440.000	PK	48.6	36.7	8.8	41.5	52.6	73.9	21.3	100	0	
Vert.	9920.000	PK	46.1	39.0	9.7	38.9	55.9	73.9	18.0	100	0	
Vert.	12400.000	PK	47.6	39.5	10.8	39.3	58.6	73.9	15.3	100	0	
Vert.	1776.423	AV	39.9	25.9	13.5	41.0	38.3	53.9	15.6	100	190	
Vert.	2323.954	AV	35.6	27.3	14.1	41.4	35.6	53.9	18.3	115	54	
Vert.	2483.500	AV	35.0	27.5	14.3	41.4	35.4	53.9	18.5	106	305	
Vert.	2484.050	AV	34.8	27.5	14.3	41.4	35.2	53.9	18.7	106	305	
Vert.	2636.018	AV	36.7	27.8	14.4	41.4	37.5	53.9	16.4	100	25	
Vert.	2886.743	AV	47.3	28.2	6.2	41.4	40.3	53.9	13.6	100	241	
Vert.	3330.810	AV	51.2	29.0	5.6	41.7	44.1	53.9	9.8	100	172	
Vert.	4960.000	AV	42.5	31.6	6.9	41.0	40.0	53.9	13.9	180	54	
Vert.	7440.000	AV	35.4	36.7	8.8	41.5	39.4	53.9	14.5	100	0	
Vert.	9920.000	AV	32.3	39.0	9.7	38.9	42.1	53.9	11.8	100	0	
Vert.	12400.000	AV	33.2	39.5	10.8	39.3	44.2	53.9	9.7	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

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

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	October 26, 2012	October 28, 2012
Temperature / Humidity	27 deg.C , 39 %RH	24 deg.C , 36 %RH
Engineer	Shinichi Takano	Shinichi Takano
Mode	Tx, 2402 MHz Tx, Bluetooth, EDR, PRBS9	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	407.096	QP	44.4	16.5	7.6	31.7	36.8	46.0	9.2	100	37	
Hori.	465.508	QP	39.5	17.0	8.0	31.7	32.8	46.0	13.2	100	224	
Hori.	474.743	QP	41.7	17.1	8.0	31.7	35.1	46.0	10.9	111	228	
Hori.	499.995	QP	42.4	17.3	8.1	31.7	36.1	46.0	9.9	100	42	
Hori.	528.009	QP	38.5	17.8	8.4	31.7	33.0	46.0	13.0	100	105	
Hori.	1776.416	PK	49.0	25.9	13.5	41.0	47.4	73.9	26.5	100	265	
Hori.	2390.000	PK	47.0	27.4	14.2	41.4	47.2	73.9	26.7	229	359	
Hori.	2400.000	PK	56.9	27.4	14.2	41.4	57.1	73.9	16.8	229	359	
Hori.	2557.992	PK	47.8	27.7	14.3	41.4	48.4	73.9	25.5	207	319	
Hori.	2886.712	PK	54.8	28.2	6.2	41.4	47.8	73.9	26.1	100	148	
Hori.	3330.810	PK	53.2	29.0	5.6	41.7	46.1	73.9	27.8	100	259	
Hori.	4804.000	PK	48.6	31.1	6.8	41.2	45.3	73.9	28.6	100	232	
Hori.	7206.000	PK	46.4	36.6	8.3	41.4	49.9	73.9	24.0	100	0	
Hori.	9608.000	PK	43.6	38.5	9.4	38.9	52.6	73.9	21.3	100	0	
Hori.	12010.000	PK	45.6	39.4	10.7	39.4	56.3	73.9	17.6	100	0	
Hori.	1776.416	AV	38.5	25.9	13.5	41.0	36.9	53.9	17.0	100	265	
Hori.	2390.000	AV	34.4	27.4	14.2	41.4	34.6	53.9	19.3	229	359	
Hori.	2400.000	AV	41.8	27.4	14.2	41.4	42.0	53.9	11.9	229	359	
Hori.	2557.992	AV	36.6	27.7	14.3	41.4	37.2	53.9	16.7	207	319	
Hori.	2886.712	AV	45.4	28.2	6.2	41.4	38.4	53.9	15.5	100	148	
Hori.	3330.810	AV	48.0	29.0	5.6	41.7	40.9	53.9	13.0	100	259	
Hori.	4804.000	AV	37.9	31.1	6.8	41.2	34.6	53.9	19.3	100	232	
Hori.	7206.000	AV	35.7	36.6	8.3	41.4	39.2	53.9	14.7	100	0	
Hori.	9608.000	AV	32.1	38.5	9.4	38.9	41.1	53.9	12.8	100	0	
Hori.	12010.000	AV	33.6	39.4	10.7	39.4	44.3	53.9	9.6	100	0	
Vert.	55.373	QP	31.4	9.2	7.2	31.9	15.9	40.0	24.1	100	231	
Vert.	592.141	QP	38.5	19.1	8.7	31.7	34.6	46.0	11.4	100	225	
Vert.	1776.432	PK	49.2	25.9	13.5	41.0	47.6	73.9	26.3	100	190	
Vert.	2390.000	PK	46.1	27.4	14.2	41.4	46.3	73.9	27.6	105	61	
Vert.	2400.000	PK	53.7	27.4	14.2	41.4	53.9	73.9	20.0	105	61	
Vert.	2557.938	PK	47.0	27.7	14.3	41.4	47.6	73.9	26.3	100	54	
Vert.	2886.711	PK	55.8	28.2	6.2	41.4	48.8	73.9	25.1	100	240	
Vert.	3330.824	PK	55.4	29.0	5.6	41.7	48.3	73.9	25.6	100	173	
Vert.	4804.000	PK	47.3	31.1	6.8	41.2	44.0	73.9	29.9	100	240	
Vert.	7206.000	PK	47.8	36.6	8.3	41.4	51.3	73.9	22.6	100	0	
Vert.	9608.000	PK	44.1	38.5	9.4	38.9	53.1	73.9	20.8	100	0	
Vert.	12010.000	PK	45.1	39.4	10.7	39.4	55.8	73.9	18.1	100	0	
Vert.	1776.432	AV	39.5	25.9	13.5	41.0	37.9	53.9	16.0	100	190	
Vert.	2390.000	AV	34.4	27.4	14.2	41.4	34.6	53.9	19.3	105	61	
Vert.	2400.000	AV	39.3	27.4	14.2	41.4	39.5	53.9	14.4	105	61	
Vert.	2557.938	AV	35.6	27.7	14.3	41.4	36.2	53.9	17.7	100	54	
Vert.	2886.711	AV	47.4	28.2	6.2	41.4	40.4	53.9	13.5	100	240	
Vert.	3330.824	AV	51.5	29.0	5.6	41.7	44.4	53.9	9.5	100	173	
Vert.	4804.000	AV	36.6	31.1	6.8	41.2	33.3	53.9	20.6	100	240	
Vert.	7206.000	AV	36.1	36.6	8.3	41.4	39.6	53.9	14.3	100	0	
Vert.	9608.000	AV	32.3	38.5	9.4	38.9	41.3	53.9	12.6	100	0	
Vert.	12010.000	AV	33.6	39.4	10.7	39.4	44.3	53.9	9.6	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

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

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	October 26, 2012	October 28, 2012
Temperature / Humidity	27 deg.C , 39 %RH	24 deg.C , 36 %RH
Engineer	Shinichi Takano	Shinichi Takano
Mode	Tx, 2441 MHz Tx, Bluetooth, EDR, PRBS9	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	444.103	QP	44.6	16.8	7.9	31.7	37.6	46.0	8.4	100	214	
Hori.	465.704	QP	44.9	17.0	8.0	31.7	38.2	46.0	7.8	103	234	
Hori.	476.137	QP	42.3	17.1	8.0	31.7	35.7	46.0	10.3	100	223	
Hori.	500.011	QP	37.6	17.3	8.1	31.7	31.3	46.0	14.7	136	357	
Hori.	518.135	QP	42.2	17.8	8.4	31.7	36.7	46.0	9.3	100	355	
Hori.	1776.404	PK	48.7	25.9	13.5	41.0	47.1	73.9	26.8	100	264	
Hori.	2596.954	PK	46.5	27.7	14.4	41.4	47.2	73.9	26.7	100	198	
Hori.	2886.710	PK	54.6	28.2	6.2	41.4	47.6	73.9	26.3	100	147	
Hori.	3330.849	PK	53.4	29.0	5.6	41.7	46.3	73.9	27.6	100	259	
Hori.	4882.000	PK	48.9	31.3	6.9	41.1	46.0	73.9	27.9	108	234	
Hori.	7323.000	PK	46.5	36.6	8.6	41.4	50.3	73.9	23.6	100	0	
Hori.	9764.000	PK	43.6	38.7	9.5	38.9	52.9	73.9	21.0	100	0	
Hori.	12205.000	PK	45.0	39.5	10.8	39.3	56.0	73.9	17.9	100	0	
Hori.	1776.404	AV	38.3	25.9	13.5	41.0	36.7	53.9	17.2	100	264	
Hori.	2596.954	AV	35.7	27.7	14.4	41.4	36.4	53.9	17.5	100	198	
Hori.	2886.710	AV	45.2	28.2	6.2	41.4	38.2	53.9	15.7	100	147	
Hori.	3330.849	AV	47.7	29.0	5.6	41.7	40.6	53.9	13.3	100	259	
Hori.	4882.000	AV	38.1	31.3	6.9	41.1	35.2	53.9	18.7	108	234	
Hori.	7323.000	AV	35.9	36.6	8.6	41.4	39.7	53.9	14.2	100	0	
Hori.	9764.000	AV	32.3	38.7	9.5	38.9	41.6	53.9	12.3	100	0	
Hori.	12205.000	AV	33.8	39.5	10.8	39.3	44.8	53.9	9.1	100	0	
Vert.	592.148	QP	38.8	19.1	8.7	31.7	34.9	46.0	11.1	100	211	
Vert.	1776.444	PK	49.7	25.9	13.5	41.0	48.1	73.9	25.8	100	190	
Vert.	2597.010	PK	47.1	27.7	14.4	41.4	47.8	73.9	26.1	100	55	
Vert.	2886.719	PK	56.1	28.2	6.2	41.4	49.1	73.9	24.8	100	239	
Vert.	3330.851	PK	56.0	29.0	5.6	41.7	48.9	73.9	25.0	100	173	
Vert.	4882.000	PK	48.9	31.3	6.9	41.1	46.0	73.9	27.9	100	237	
Vert.	7323.000	PK	47.8	36.6	8.6	41.4	51.6	73.9	22.3	100	0	
Vert.	9764.000	PK	43.6	38.7	9.5	38.9	52.9	73.9	21.0	100	0	
Vert.	12205.000	PK	45.0	39.5	10.8	39.3	56.0	73.9	17.9	100	0	
Vert.	1776.444	AV	39.5	25.9	13.5	41.0	37.9	53.9	16.0	100	190	
Vert.	2597.010	AV	35.6	27.7	14.4	41.4	36.3	53.9	17.6	100	55	
Vert.	2886.719	AV	47.6	28.2	6.2	41.4	40.6	53.9	13.3	100	239	
Vert.	3330.851	AV	51.7	29.0	5.6	41.7	44.6	53.9	9.3	100	173	
Vert.	4882.000	AV	36.4	31.3	6.9	41.1	33.5	53.9	20.4	100	237	
Vert.	7323.000	AV	36.1	36.6	8.6	41.4	39.9	53.9	14.0	100	0	
Vert.	9764.000	AV	32.5	38.7	9.5	38.9	41.8	53.9	12.1	100	0	
Vert.	12205.000	AV	33.8	39.5	10.8	39.3	44.8	53.9	9.1	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$ **UL Japan, Inc.****Shonan EMC Lab.**

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber	No.2 Semi Anechoic Chamber
Date	October 26, 2012	October 28, 2012
Temperature / Humidity	27 deg.C , 39 %RH	24 deg.C , 36 %RH
Engineer	Shinichi Takano	Shinichi Takano
Mode	Tx, 2480 MHz Tx, Bluetooth, EDR, PRBS9	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	407.099	QP	44.0	16.5	7.6	31.7	36.4	46.0	9.6	100	25	
Hori.	500.010	QP	39.7	17.3	8.3	31.7	33.6	46.0	12.4	101	30	
Hori.	1776.438	PK	48.5	25.9	13.5	41.0	46.9	73.9	27.0	100	265	
Hori.	2323.907	PK	47.0	27.3	14.1	41.4	47.0	73.9	26.9	100	5	
Hori.	2483.500	PK	46.5	27.5	14.3	41.4	46.9	73.9	27.0	261	359	
Hori.	2636.003	PK	47.5	27.8	14.4	41.4	48.3	73.9	25.6	185	67	
Hori.	2886.713	PK	53.4	28.2	6.2	41.4	46.4	73.9	27.5	100	147	
Hori.	3330.840	PK	52.6	29.0	5.6	41.7	45.5	73.9	28.4	100	259	
Hori.	4960.000	PK	49.2	31.6	6.9	41.0	46.7	73.9	27.2	100	189	
Hori.	7440.000	PK	48.1	36.7	8.8	41.5	52.1	73.9	21.8	100	0	
Hori.	9920.000	PK	44.4	39.0	9.7	38.9	54.2	73.9	19.7	100	0	
Hori.	12400.000	PK	44.8	39.5	10.8	39.3	55.8	73.9	18.1	100	0	
Hori.	1776.438	AV	38.3	25.9	13.5	41.0	36.7	53.9	17.2	100	265	
Hori.	2323.907	AV	35.6	27.3	14.1	41.4	35.6	53.9	18.3	100	5	
Hori.	2483.500	AV	35.6	27.5	14.3	41.4	36.0	53.9	17.9	261	359	
Hori.	2636.003	AV	36.7	27.8	14.4	41.4	37.5	53.9	16.4	185	67	
Hori.	2886.713	AV	44.6	28.2	6.2	41.4	37.6	53.9	16.3	100	147	
Hori.	3330.840	AV	47.3	29.0	5.6	41.7	40.2	53.9	13.7	100	259	
Hori.	4960.000	AV	38.6	31.6	6.9	41.0	36.1	53.9	17.8	100	189	
Hori.	7440.000	AV	35.6	36.7	8.8	41.5	39.6	53.9	14.3	100	0	
Hori.	9920.000	AV	32.2	39.0	9.7	38.9	42.0	53.9	11.9	100	0	
Hori.	12400.000	AV	33.1	39.5	10.8	39.3	44.1	53.9	9.8	100	0	
Vert.	67.834	QP	32.1	6.8	7.1	31.9	14.1	40.0	25.9	100	165	
Vert.	481.121	QP	44.4	17.1	8.1	31.7	37.9	46.0	8.1	131	244	
Vert.	518.132	QP	42.7	17.7	8.3	31.7	37.0	46.0	9.0	100	358	
Vert.	592.154	QP	39.2	19.1	8.7	31.7	35.3	46.0	10.7	100	218	
Vert.	1776.414	PK	49.8	25.9	13.5	41.0	48.2	73.9	25.7	100	189	
Vert.	2323.966	PK	47.3	27.3	14.1	41.4	47.3	73.9	26.6	113	49	
Vert.	2483.500	PK	46.6	27.5	14.3	41.4	47.0	73.9	26.9	104	304	
Vert.	2635.943	PK	46.5	27.8	14.4	41.4	47.3	73.9	26.6	100	25	
Vert.	2886.715	PK	56.0	28.2	6.2	41.4	49.0	73.9	24.9	100	238	
Vert.	3330.836	PK	55.3	29.0	5.6	41.7	48.2	73.9	25.7	100	172	
Vert.	4960.000	PK	49.4	31.6	6.9	41.0	46.9	73.9	27.0	180	54	
Vert.	7440.000	PK	47.0	36.7	8.8	41.5	51.0	73.9	22.9	100	0	
Vert.	9920.000	PK	43.9	39.0	9.7	38.9	53.7	73.9	20.2	100	0	
Vert.	12400.000	PK	45.5	39.5	10.8	39.3	56.5	73.9	17.4	100	0	
Vert.	1776.414	AV	39.4	25.9	13.5	41.0	37.8	53.9	16.1	100	189	
Vert.	2323.966	AV	35.8	27.3	14.1	41.4	35.8	53.9	18.1	113	49	
Vert.	2483.500	AV	35.0	27.5	14.3	41.4	35.4	53.9	18.5	104	304	
Vert.	2635.943	AV	35.8	27.8	14.4	41.4	36.6	53.9	17.3	100	25	
Vert.	2886.715	AV	47.0	28.2	6.2	41.4	40.0	53.9	13.9	100	238	
Vert.	3330.836	AV	51.0	29.0	5.6	41.7	43.9	53.9	10.0	100	172	
Vert.	4960.000	AV	38.2	31.6	6.9	41.0	35.7	53.9	18.2	180	54	
Vert.	7440.000	AV	35.3	36.7	8.8	41.5	39.3	53.9	14.6	100	0	
Vert.	9920.000	AV	32.1	39.0	9.7	38.9	41.9	53.9	12.0	100	0	
Vert.	12400.000	AV	33.1	39.5	10.8	39.3	44.1	53.9	9.8	100	0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$ **UL Japan, Inc.****Shonan EMC Lab.**

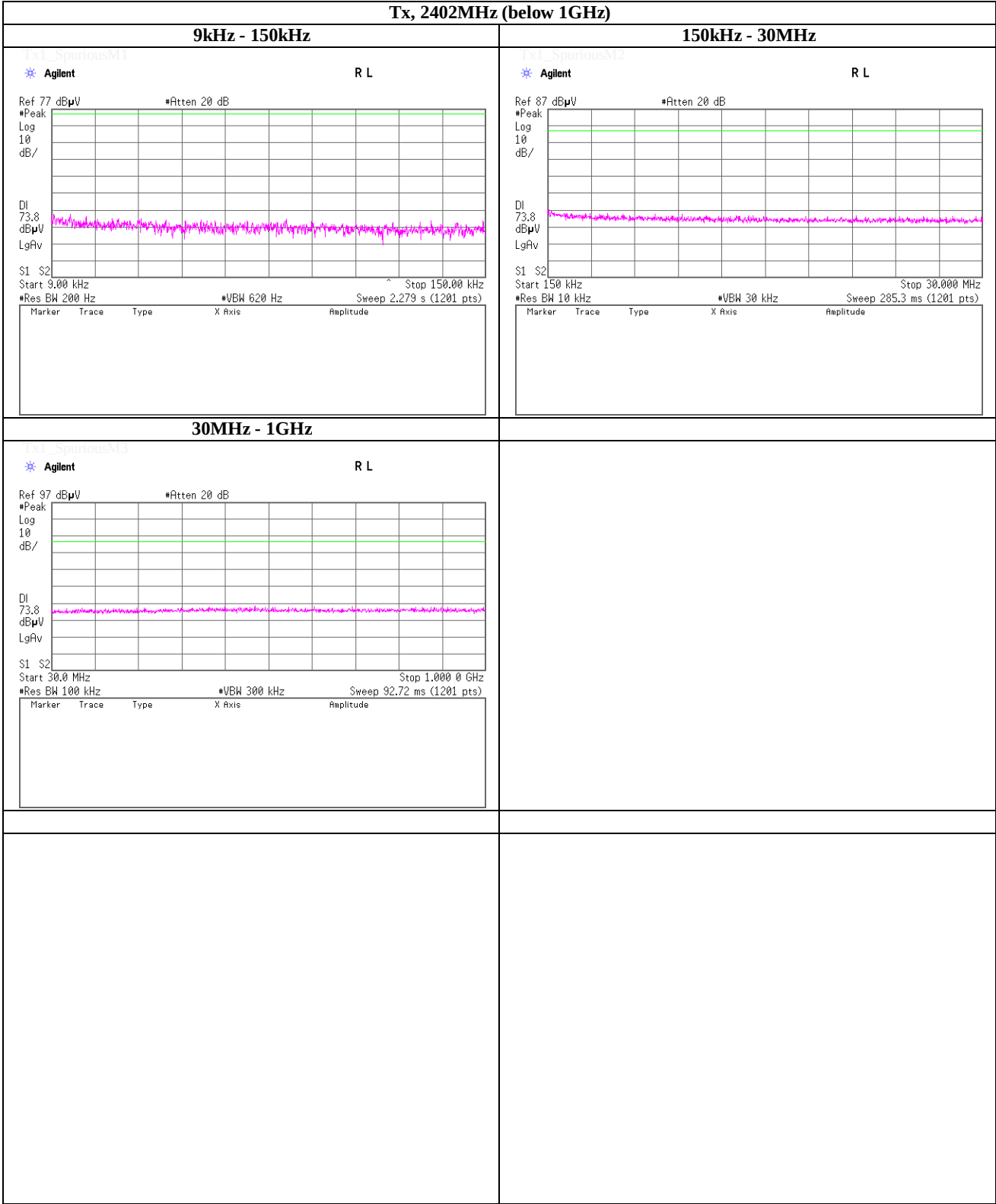
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

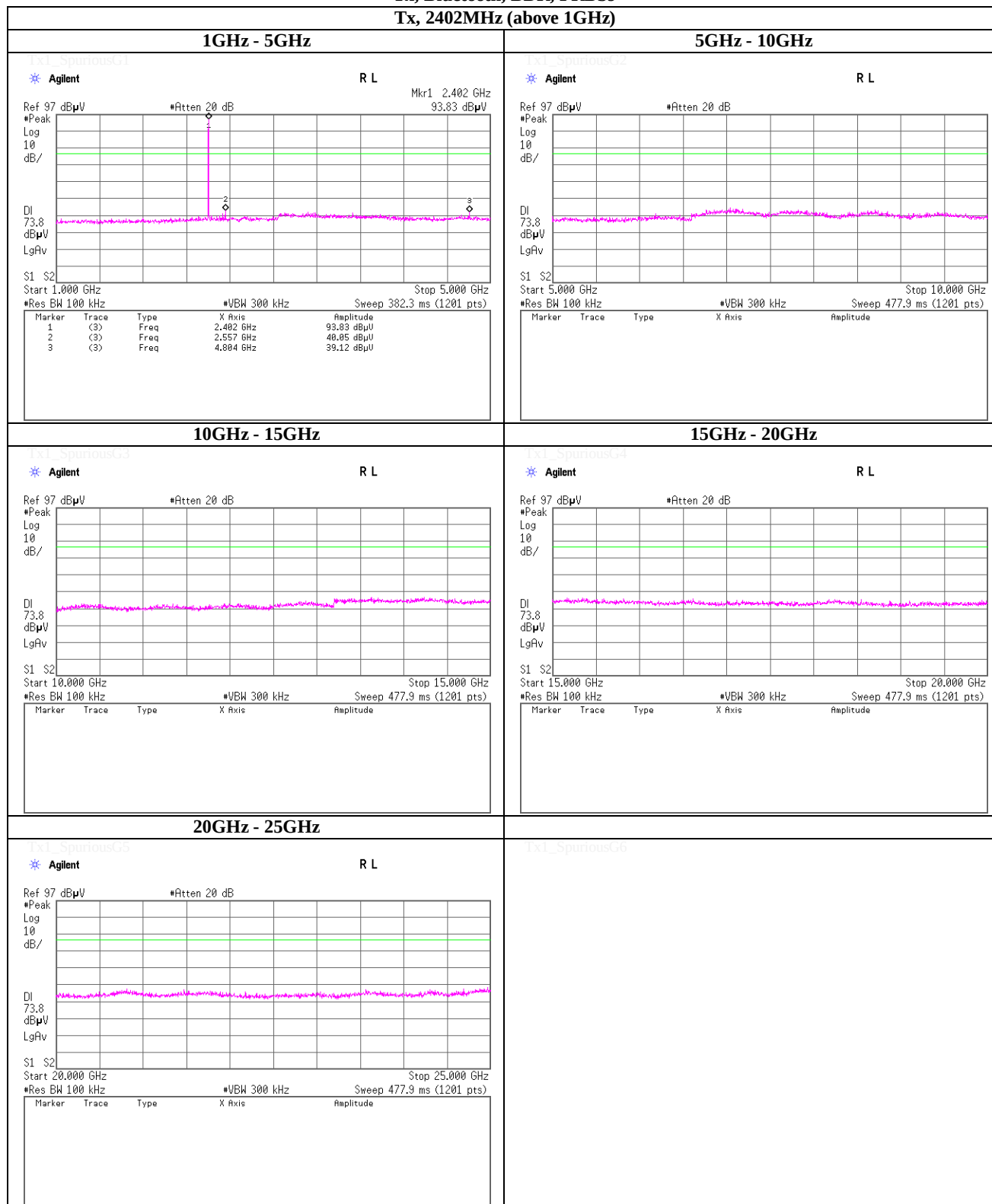
Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9
Tx, 2402MHz (below 1GHz)

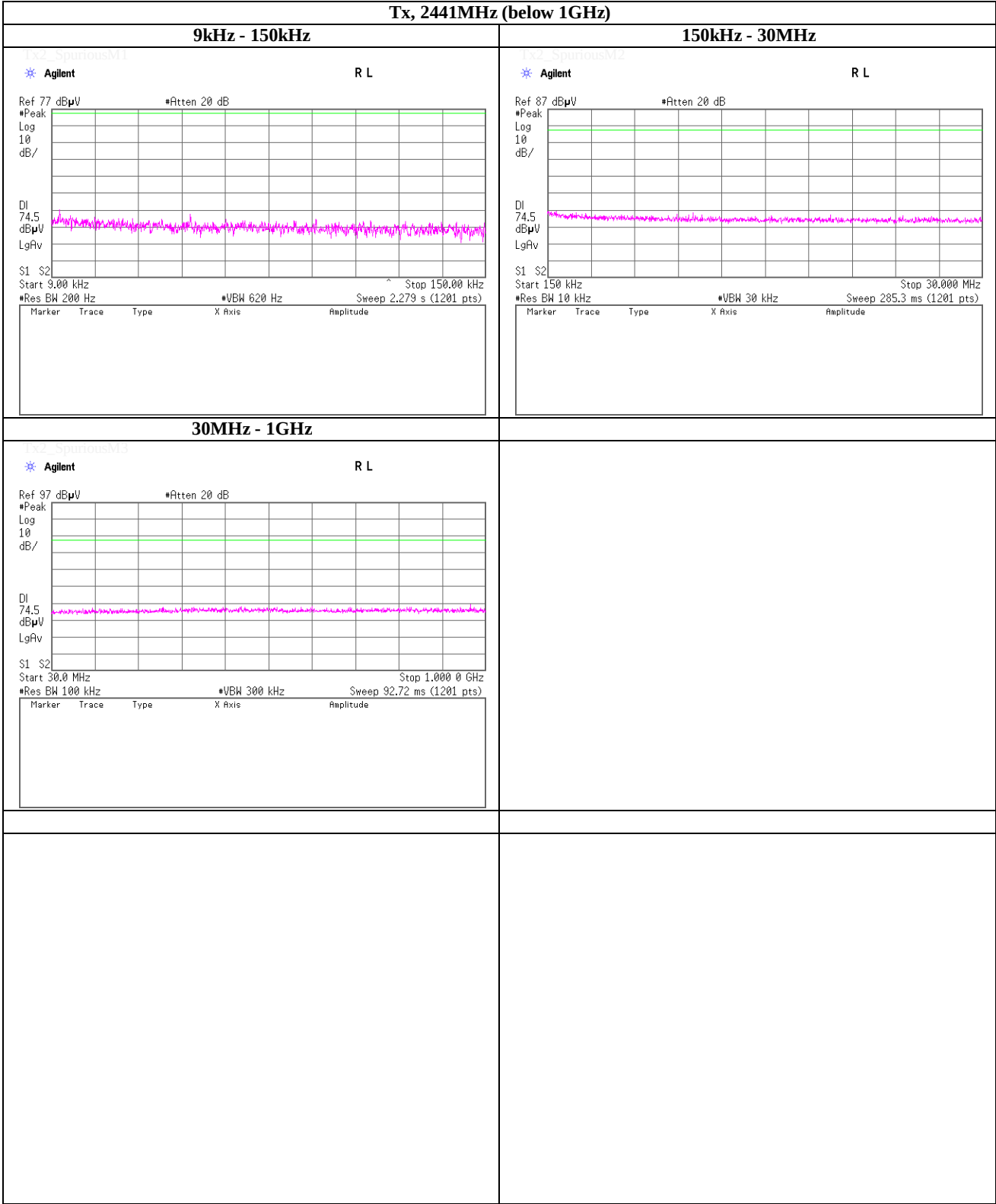


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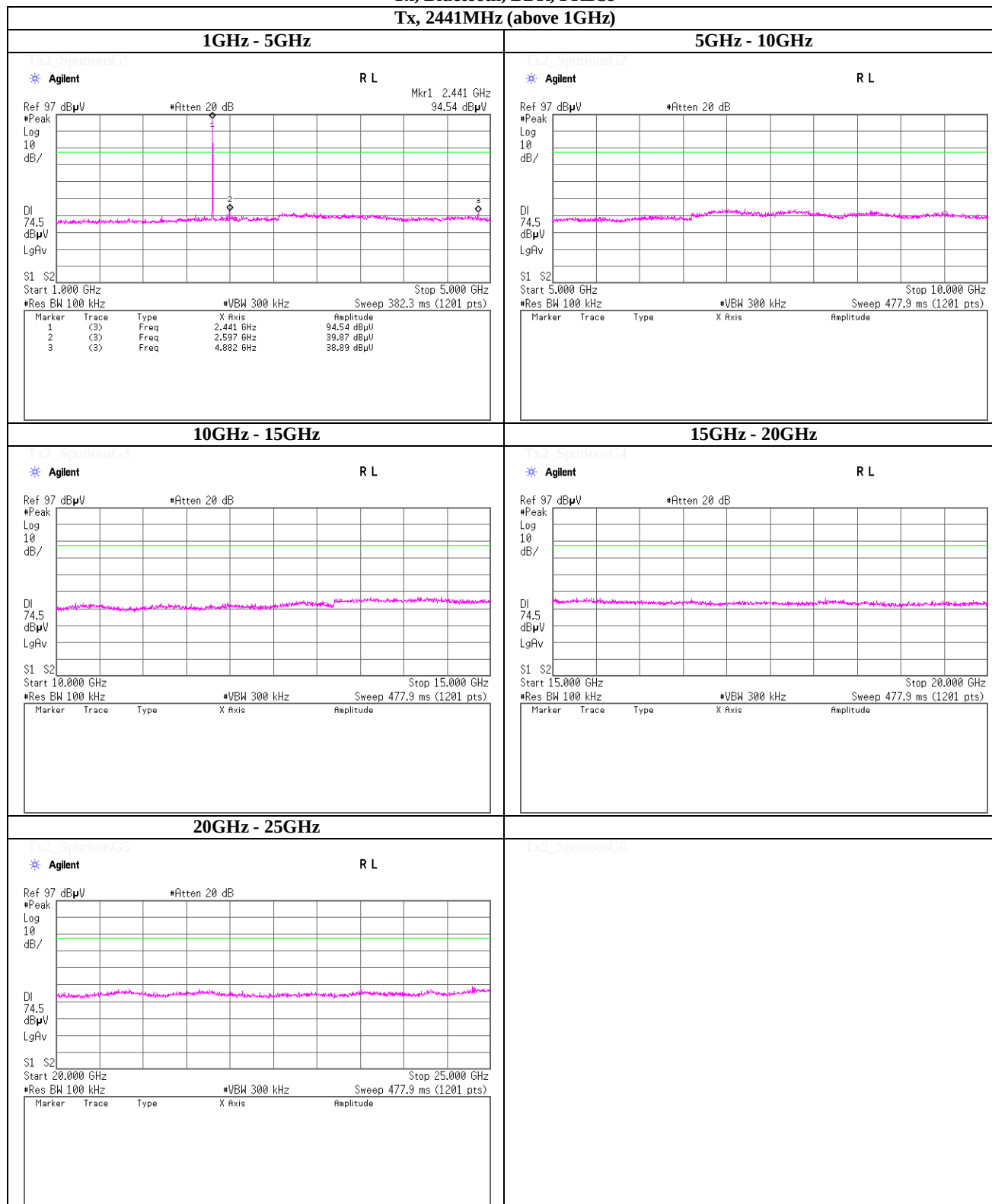
Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx, 2402MHz (above 1GHz)****UL Japan, Inc.****Shonan EMC Lab.****1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN****Telephone : +81 463 50 6400****Facsimile : +81 463 50 6401**

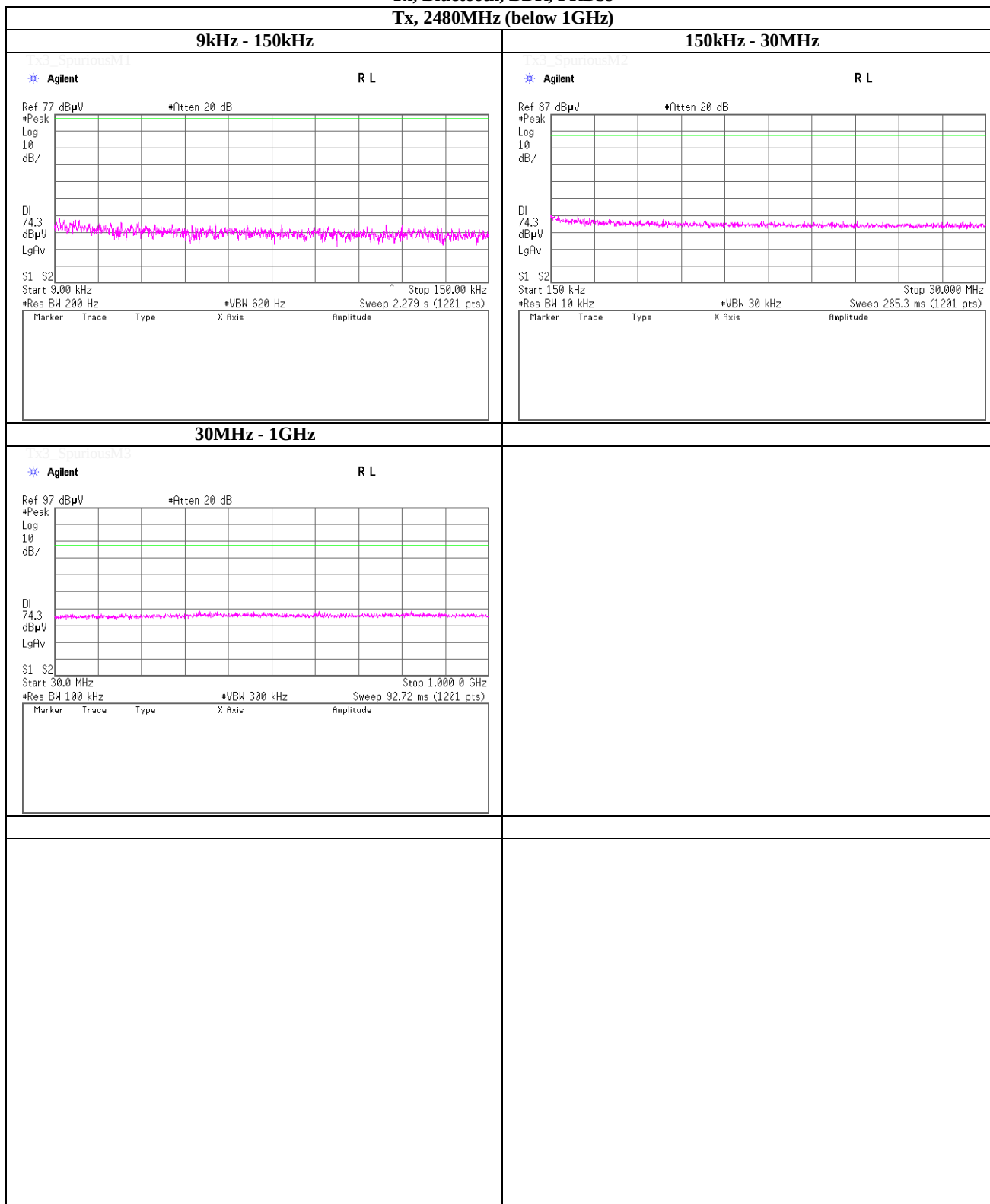
Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9
Tx, 2441MHz (below 1GHz)



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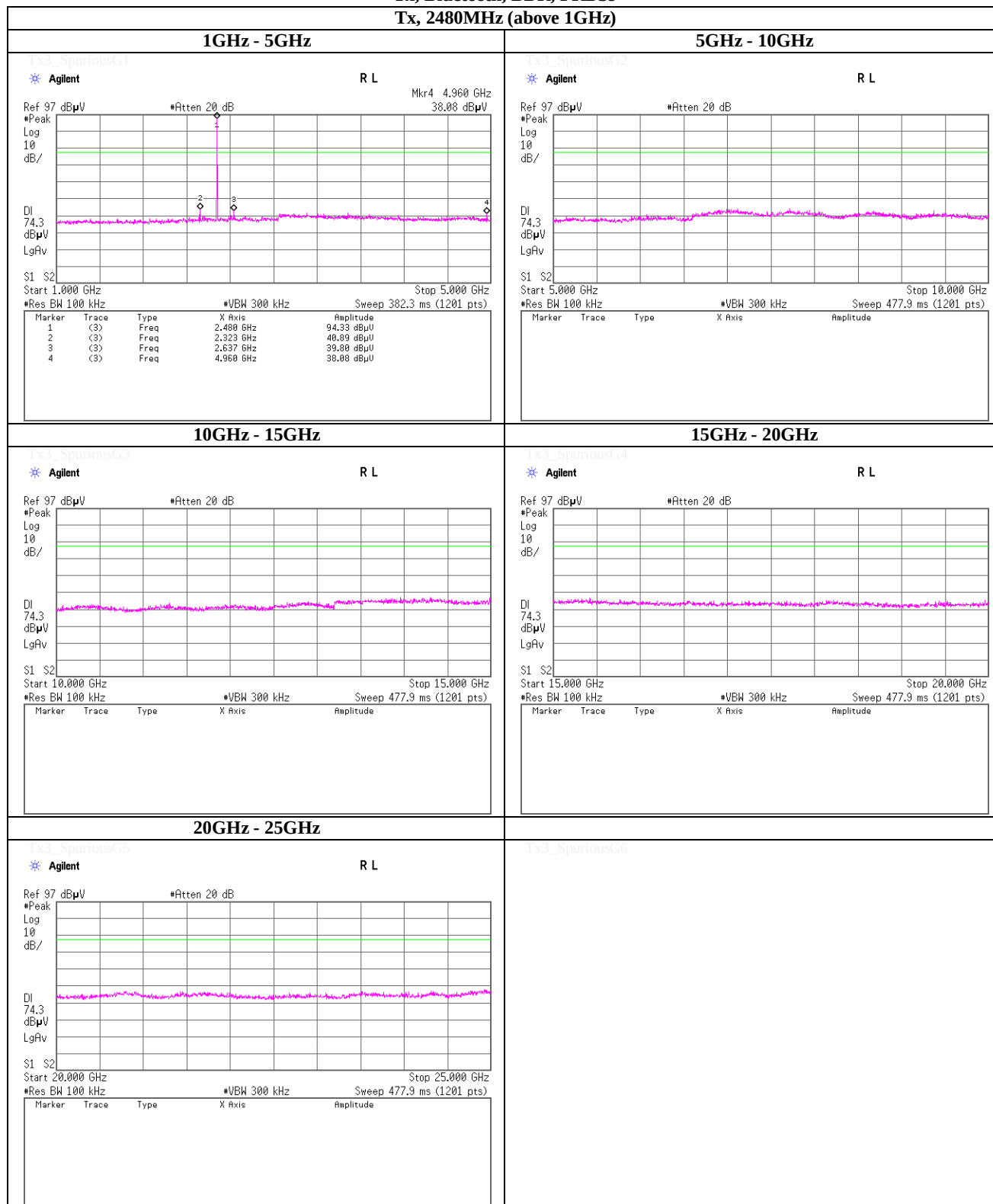
Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx, 2441MHz (above 1GHz)****UL Japan, Inc.****Shonan EMC Lab.****1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN****Telephone : +81 463 50 6400****Facsimile : +81 463 50 6401**

Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx, 2480MHz (below 1GHz)****UL Japan, Inc.****Shonan EMC Lab.**

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Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx, 2480MHz (above 1GHz)****UL Japan, Inc.****Shonan EMC Lab.**

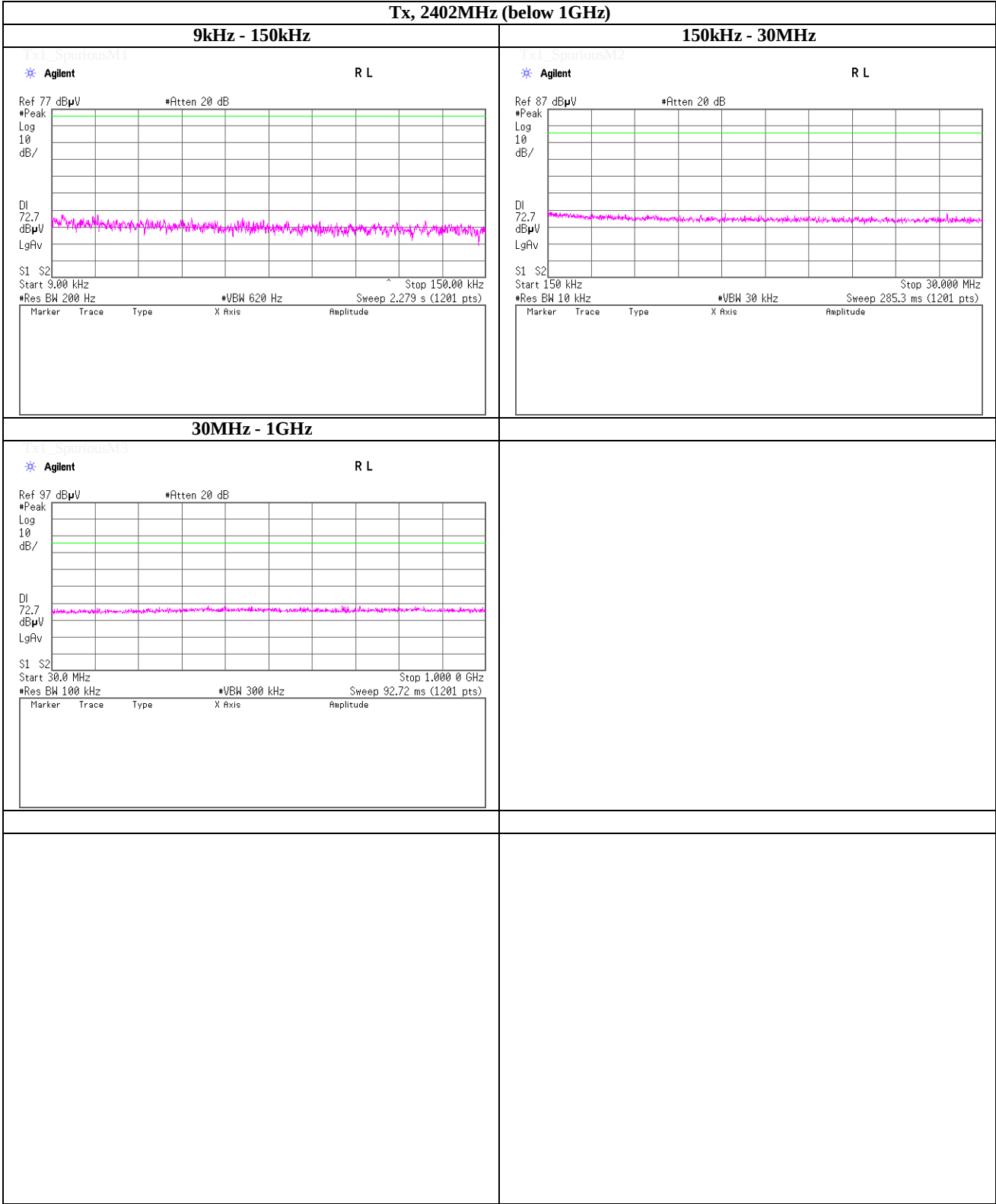
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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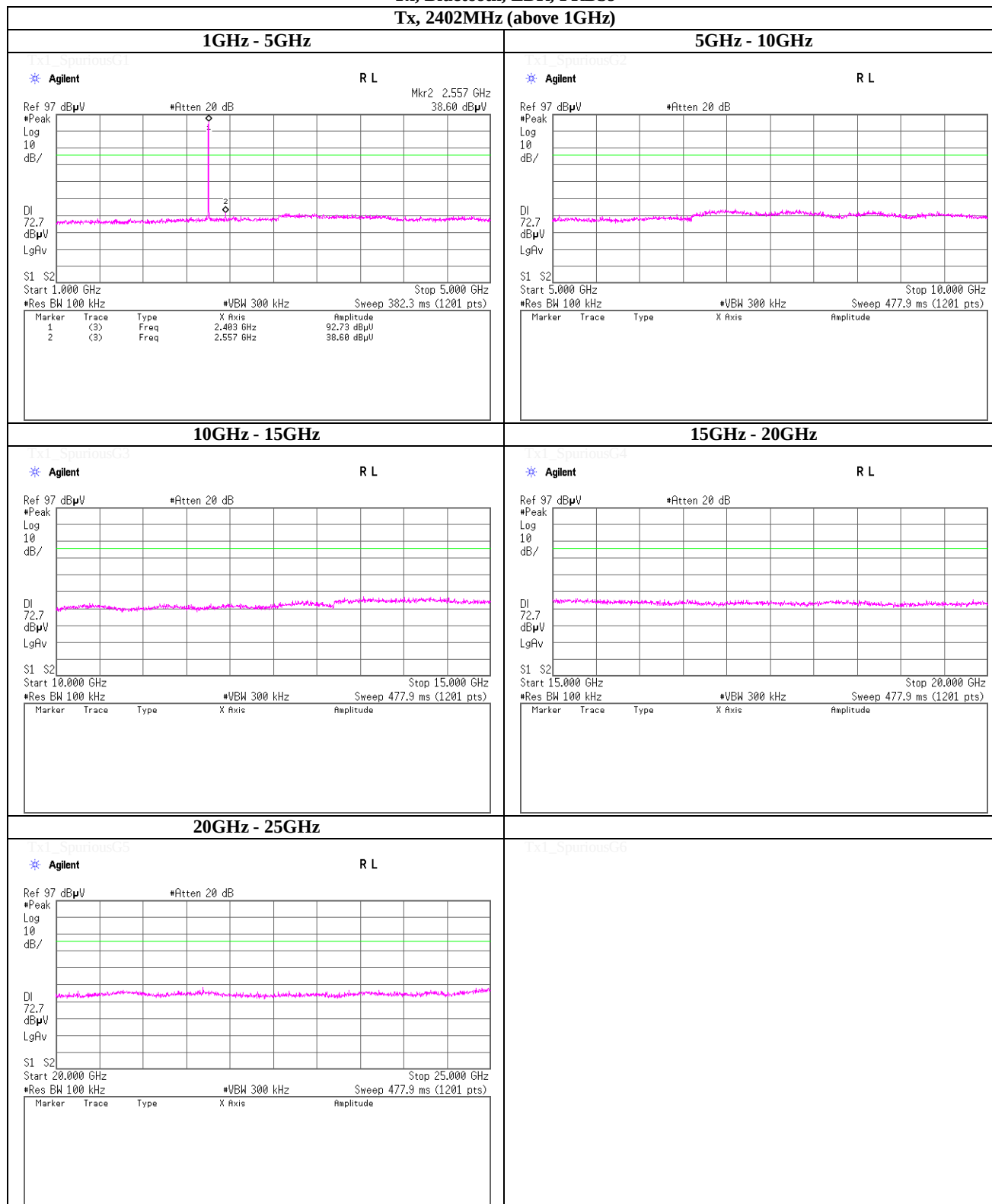
Facsimile : +81 463 50 6401

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)****UL Japan, Inc.****Shonan EMC Lab.**

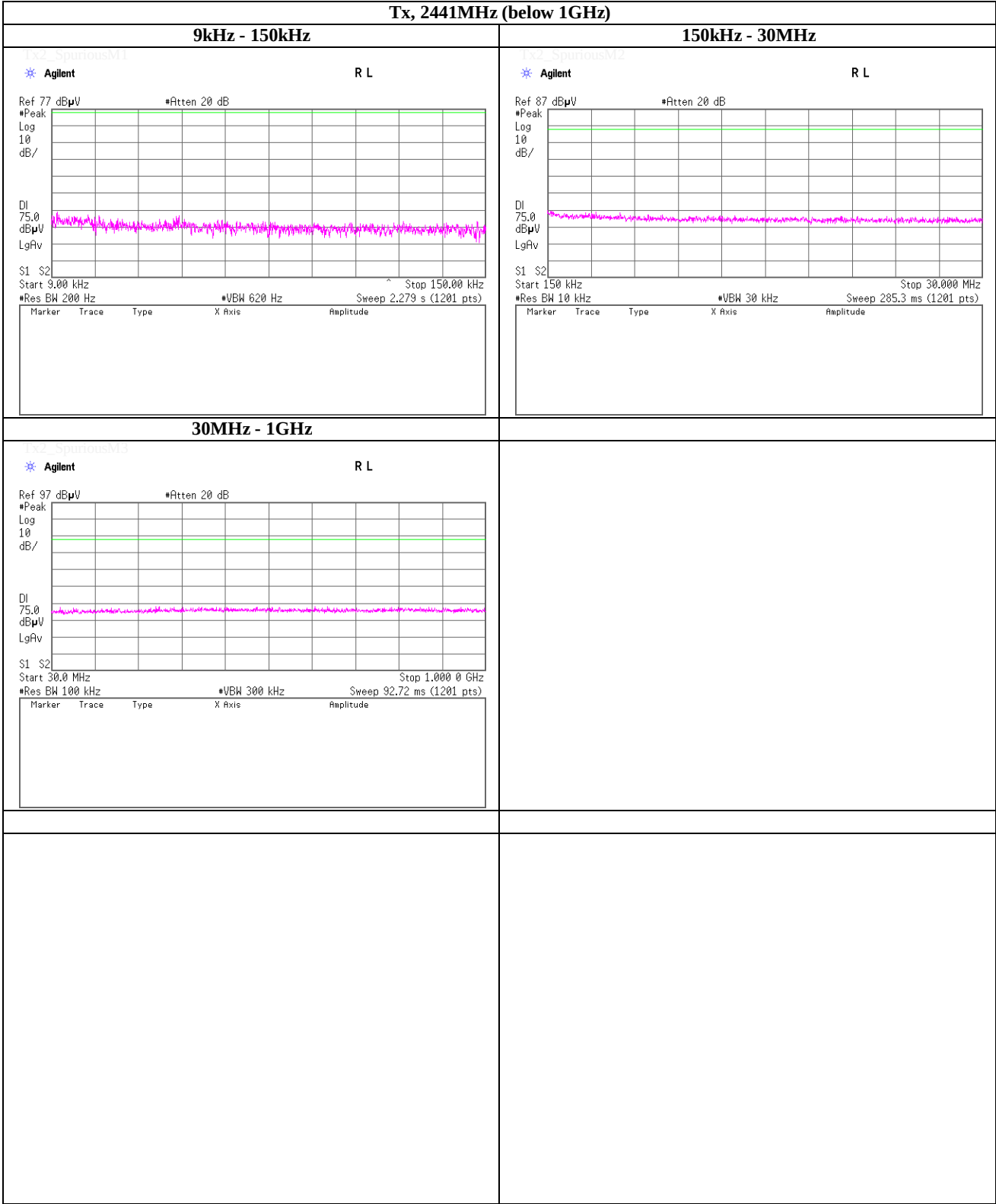
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

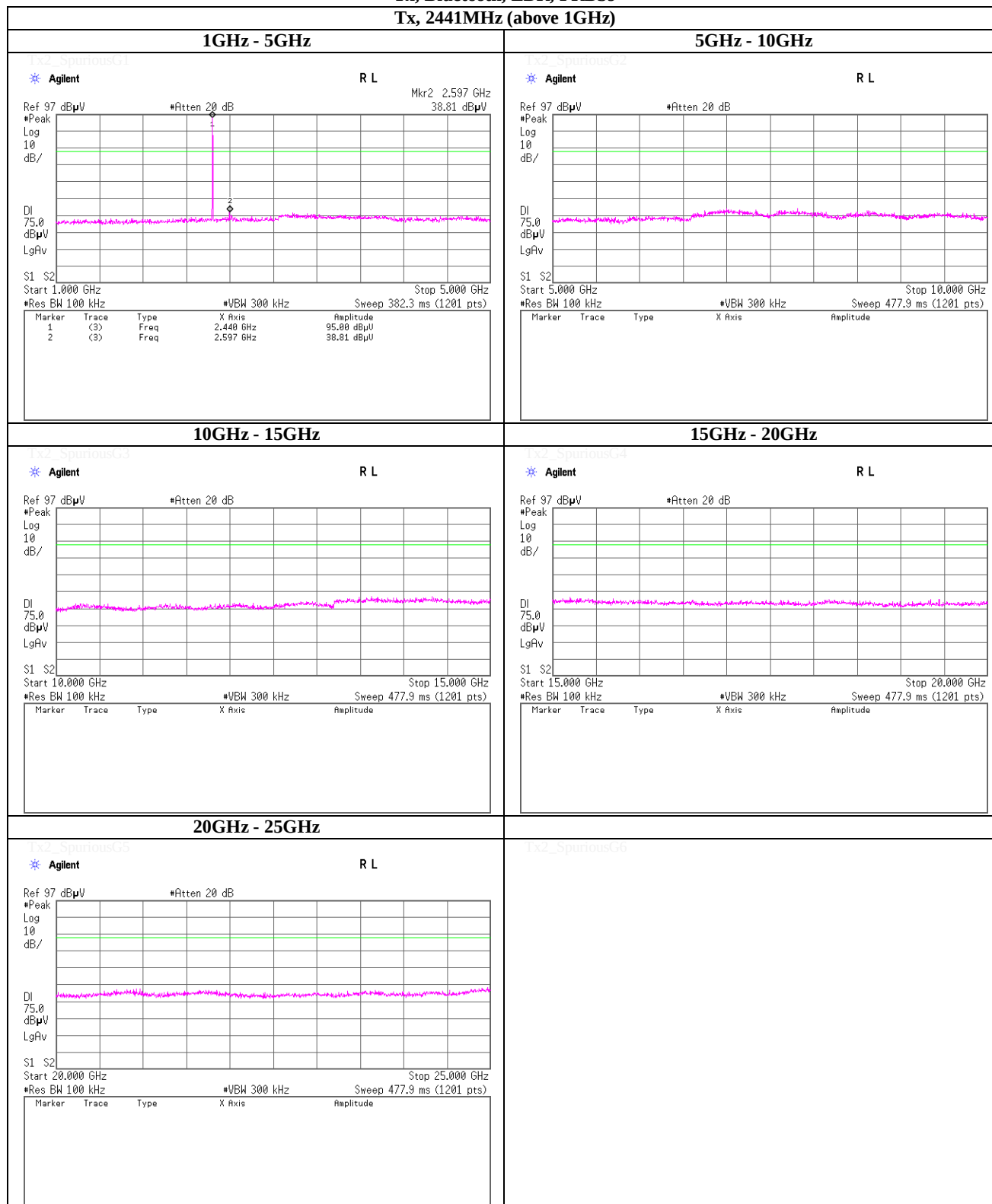
Telephone : +81 463 50 6400

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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9
Tx, 2441MHz (below 1GHz)

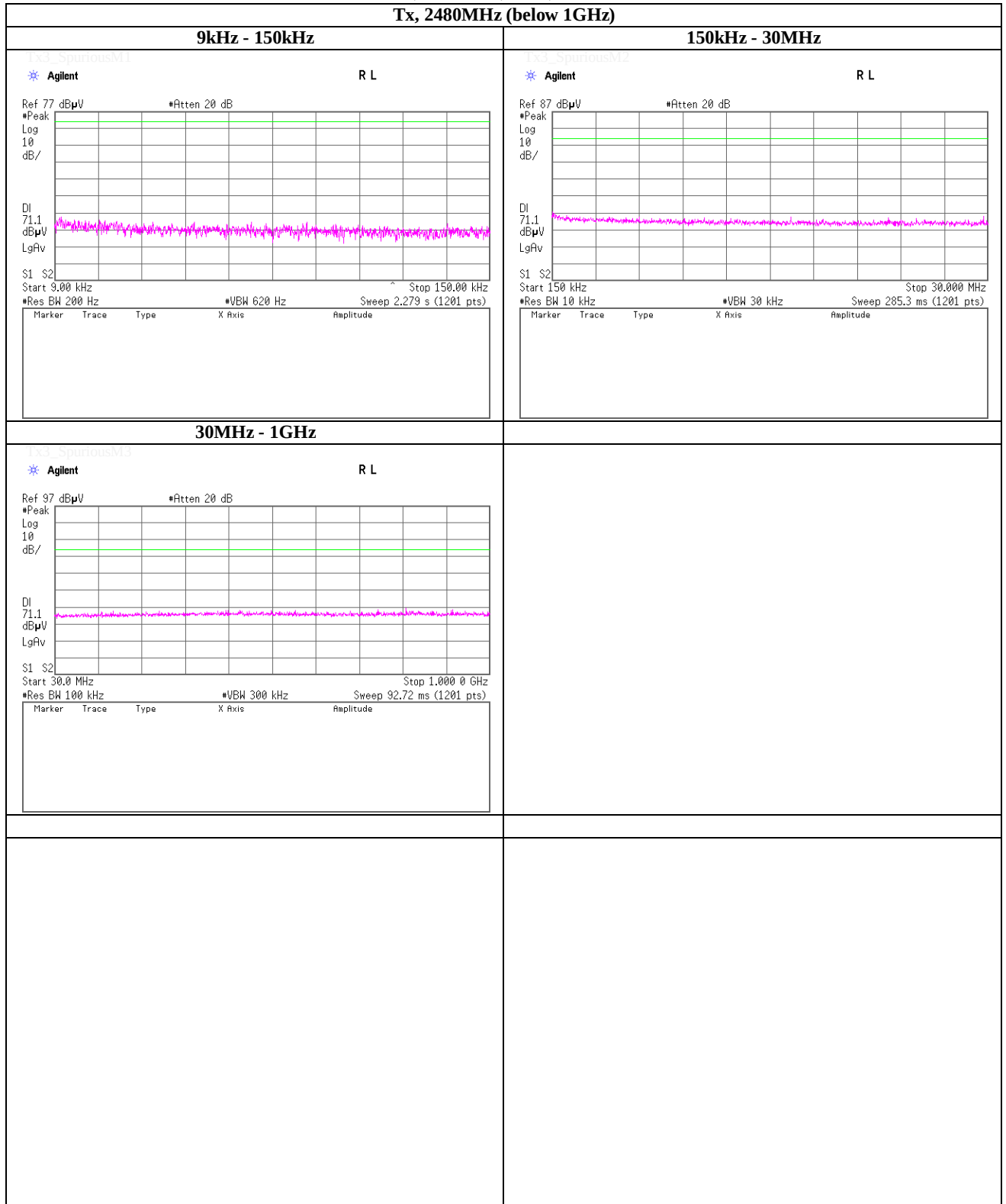


Spurious emission (Conducted)**Tx, Bluetooth, EDR, PRBS9****Tx, 2441MHz (above 1GHz)****UL Japan, Inc.****Shonan EMC Lab.****1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN****Telephone : +81 463 50 6400****Facsimile : +81 463 50 6401**

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 1GHz)



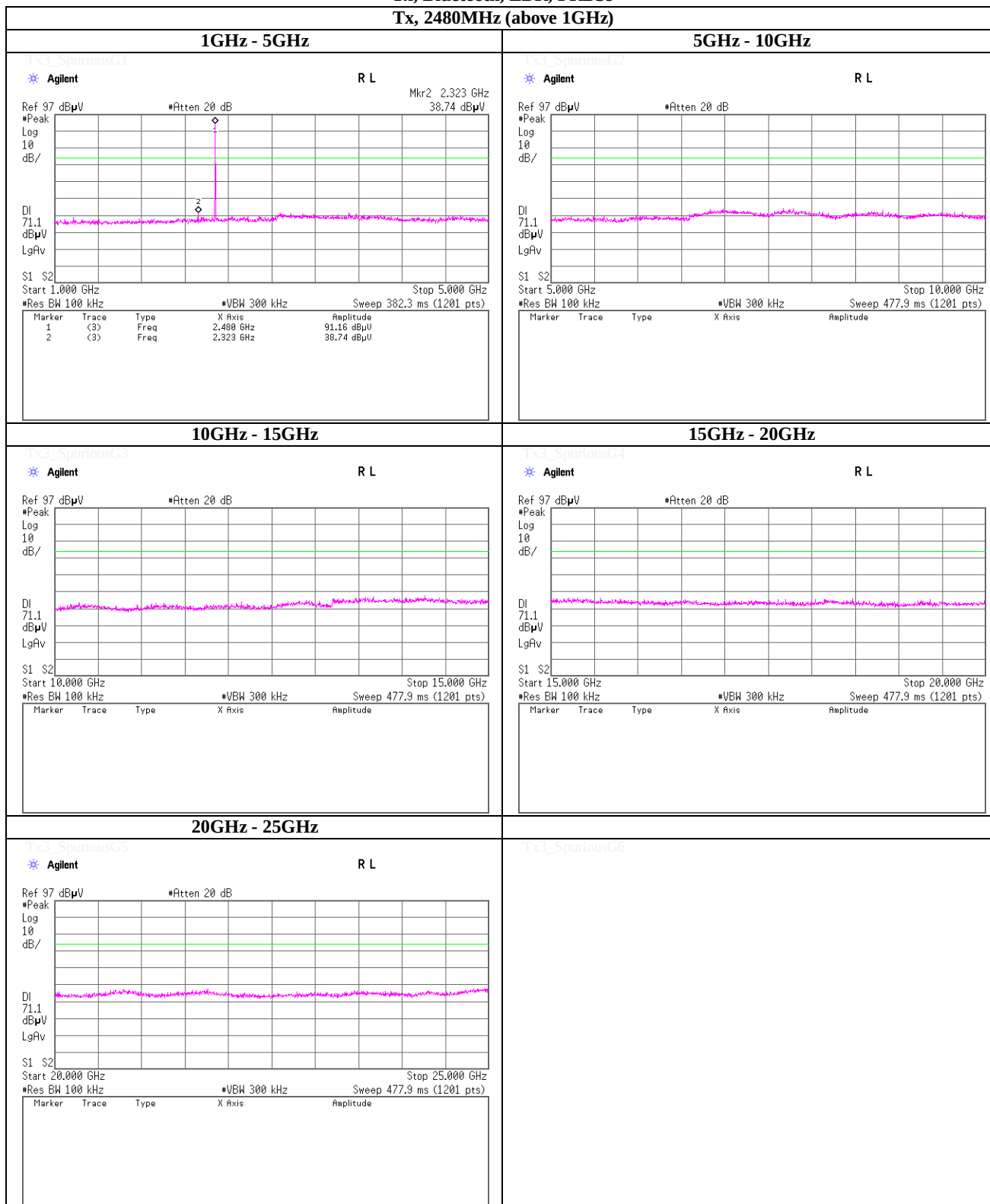
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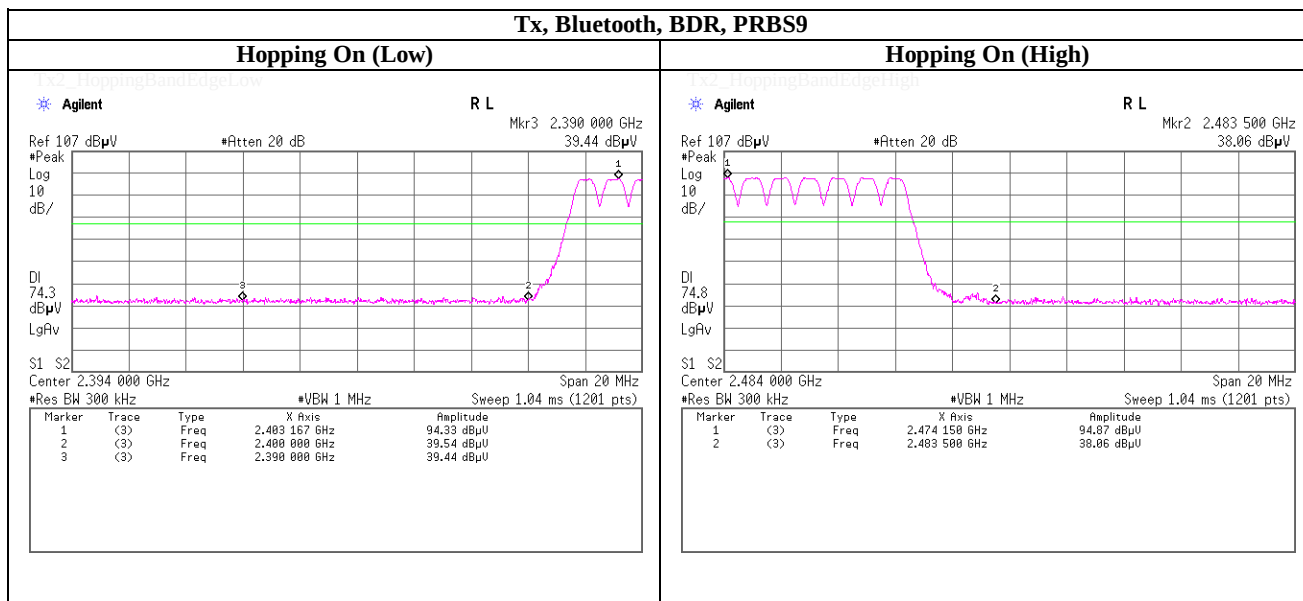
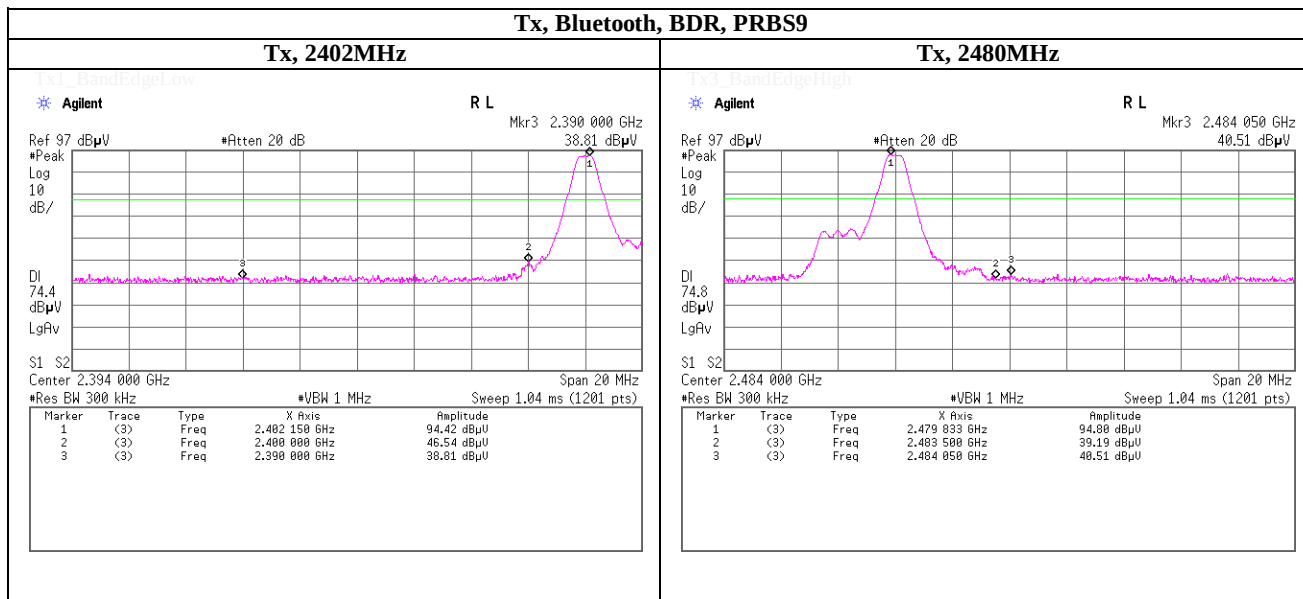
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Spurious emission (Conducted)**Tx, Bluetooth, EDR, PRBS9****Tx, 2480MHz (above 1GHz)****UL Japan, Inc.****Shonan EMC Lab.****1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN****Telephone : +81 463 50 6400****Facsimile : +81 463 50 6401**

Spurious emission (Conducted)

Band Edge compliance



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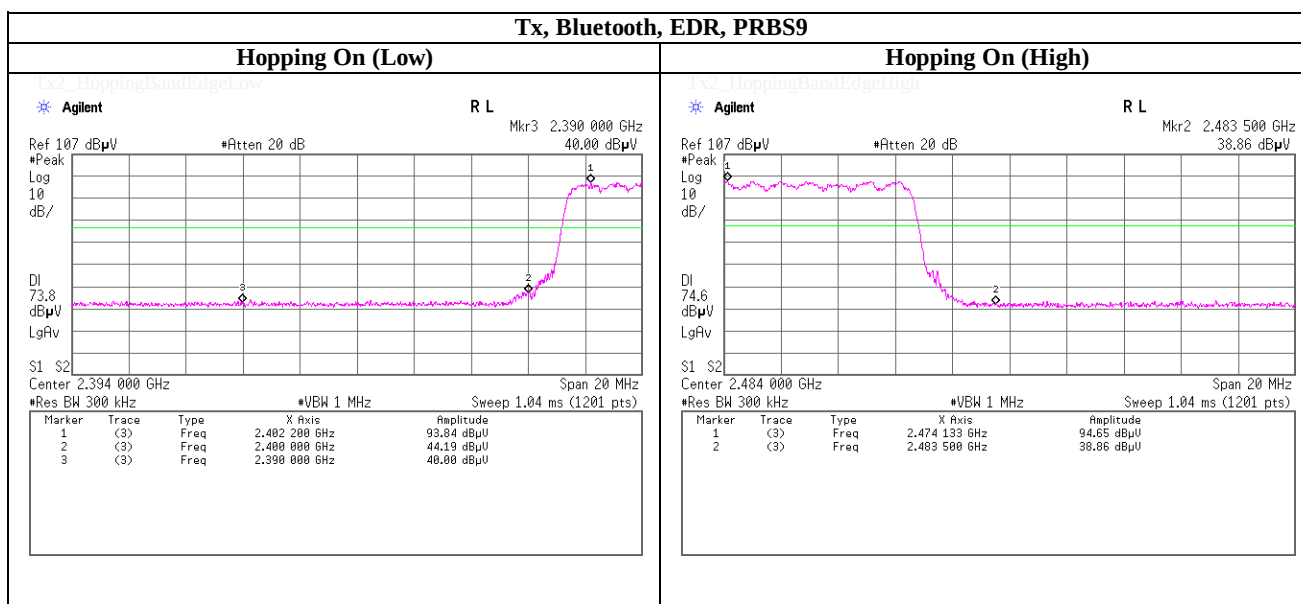
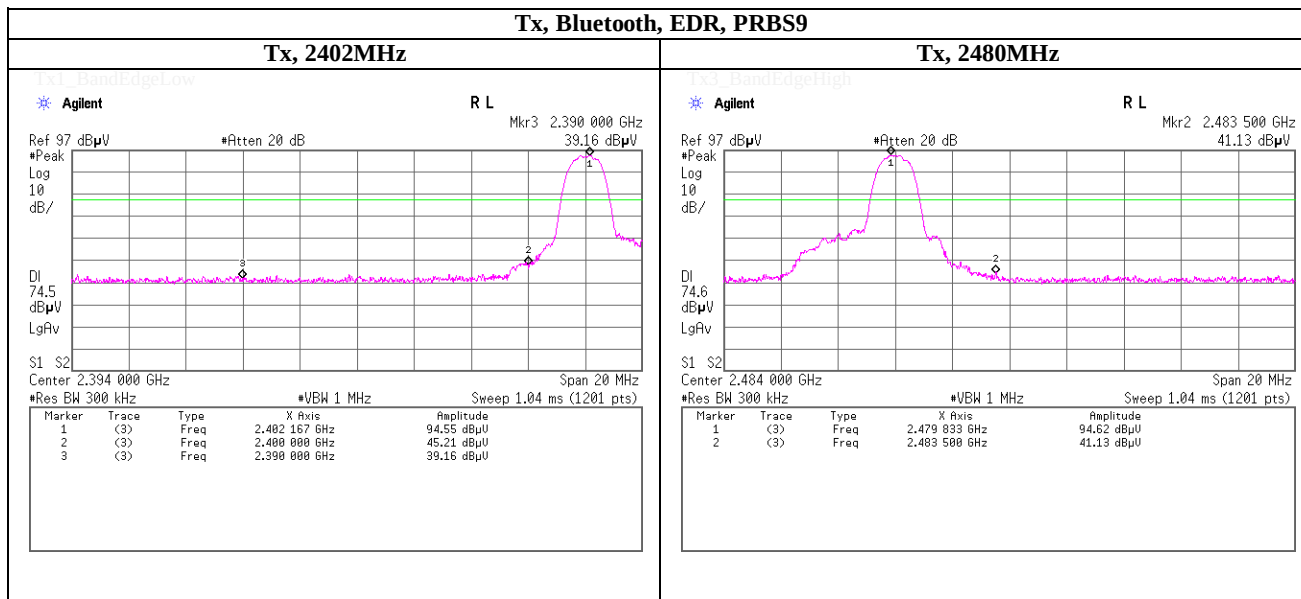
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Spurious emission (Conducted)

Band Edge compliance



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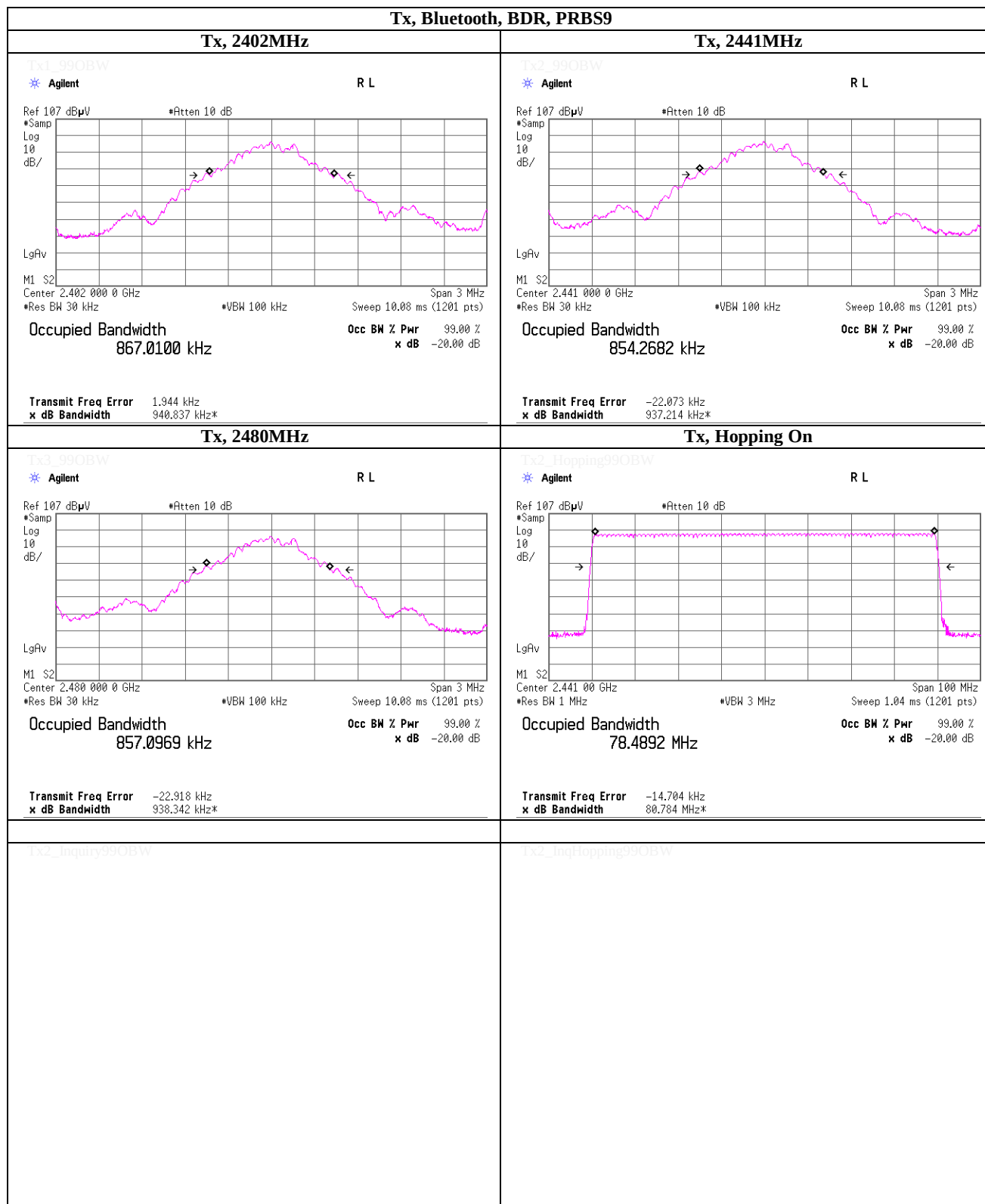
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99% Occupied Bandwidth



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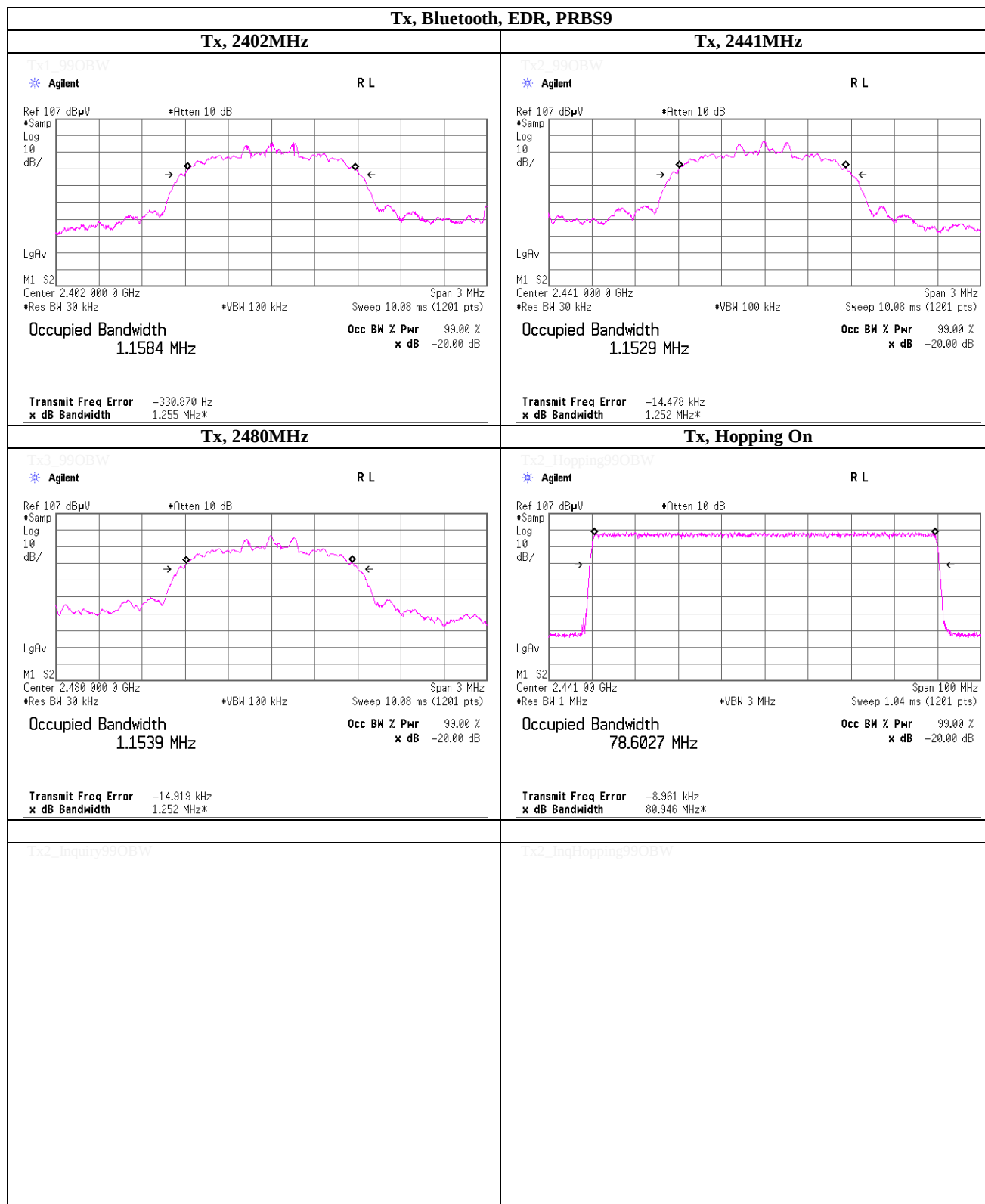
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99% Occupied Bandwidth



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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	2012/04/19 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2012/04/19 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2012/03/16 * 12
SCC-G27	Coaxial Cable	Junkosha	MWX241-01000KM SKMS	SEP-20-12-00 1	AT	2012/09/26 * 12
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2012/04/06 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2012/03/26 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2012/09/21 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2012/07/18 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2012/04/10 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2012/05/22 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2012/08/17 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2012/02/06 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2012/02/16 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE	-
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2011/12/27 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2011/12/27 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2012/02/10 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2012/02/10 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2012/08/07 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2011/11/16 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2012/04/10 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2012/04/10 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2011/11/16 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2012/02/06 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	RE	2012/09/03 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2012/09/21 * 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: Radiated emission ,

AT: Antenna terminal conducted test