



Test report No. : 33AE0185-SH-02-A
Page : 1 of 57
Issued date : November 28, 2012
FCC ID : AJDK059

RADIO TEST REPORT

Test Report No.: 33AE0185-SH-02-A

Applicant : PIONEER CORPORATION
Type of Equipment : DVD RDS AV RECEIVER
Model No. : AVH-X8500BHS
FCC ID : AJDK059
Test regulation : FCC Part15 Subpart C: 2012
Test result : Complied

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Date of test: November 11 to 14, 2012

Tested by: 
Akio Hayashi
Engineer of WiSE Japan,
UL Verification Service

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

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
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13-EM-F0429

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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
Facsimile Number : +81-49-228-6493
Contact Person : Makoto Kaieda

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

2.1 Identification of E.U.T.

Type of Equipment : DVD RDS AV RECEIVER
Model No. : AVH-X8500BHS
Serial No. : See Section 4.
Rating : DC 14.4V
Country of Mass-production : Thailand
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 : November 8, 2012

2.2 Product description

Model: AVH-X8500BHS (referred to as the EUT in this report) is a DVD RDS AV RECEIVER.

Clock Frequency:

- (1) FM/AM TUNER: 36.48MHz
- (2) DVD DRIVE
 - DVD DECODER: 27MHz, 33.8688MHz, 36.864MHz , 33.8MHz, 40.5MHz, 67.5MHz, 108MHz
 - Motor Driver: 100kHz
- (3) DC-DC CONVERTER: 365.78kHz/413.9kHz
- (4) SYSTEM MICRO COMPUTER: 3.93216MHz , 47.18592MHz - 45.29848MHz
- (5) RISC MICROCOMPUTER: 500MHz, 166.7MHz, 41.7MHz, 27MHz, 22.5792MHz, 48MHz, 33.333MHz
- (6) Blue tooth module OSC: 26MHz
- (7) LCD BACK LIGHT DRIVER: 476.6kHz/515.7kHz
- (8) VIDEO DECODER 27MHz, 33.231MHz, 33.333MHz, 32MHz
- (9) HDMI RECEIVER 27M

Equipment type	: Transceiver
Frequency of operation	: 2402-2480MHz
Bandwidth & channel spacing	: 1MHz
Type of modulation	: GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna type	: Pattern
Antenna gain with cable loss	: -8.2dBi (max)
Antenna connector type	: None
Operation temperature range	: -10 to +60 deg.C.

FCC 15.31 (e)

The equipment provides the Bluetooth transmitter with stable power supply (DC1.8V and 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.

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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

* The revision on August 13, 2012 does not affect the test specification applied to the EUT.
 The EUT complies with FCC Part 15 Subpart B. The test is performed by the customer.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	-	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	5.1dB Freq.: 243.002MHz Polarization: Horizontal Detection: Quasi Peak Mode: Tx 2480MHz, 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	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

Radiated emission test

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 Full-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)/Inquiry, Payload: PRBS9	-
20dB bandwidth	Transmitting Hopping OFF (DH5/3DH5)/Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Number of hopping frequency	Transmitting Hopping ON (DH5/3DH5)/Inquiry, Payload: PRBS9	-
Dwell time	Transmitting (Hopping ON), Payload: PRBS9 -DH1, -DH3, -DH5 -3DH1, -3DH3, -3DH5 -Inquiry	-
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: 4

Software name: BT module only Control software manufactured by ver.: V1.27.20

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

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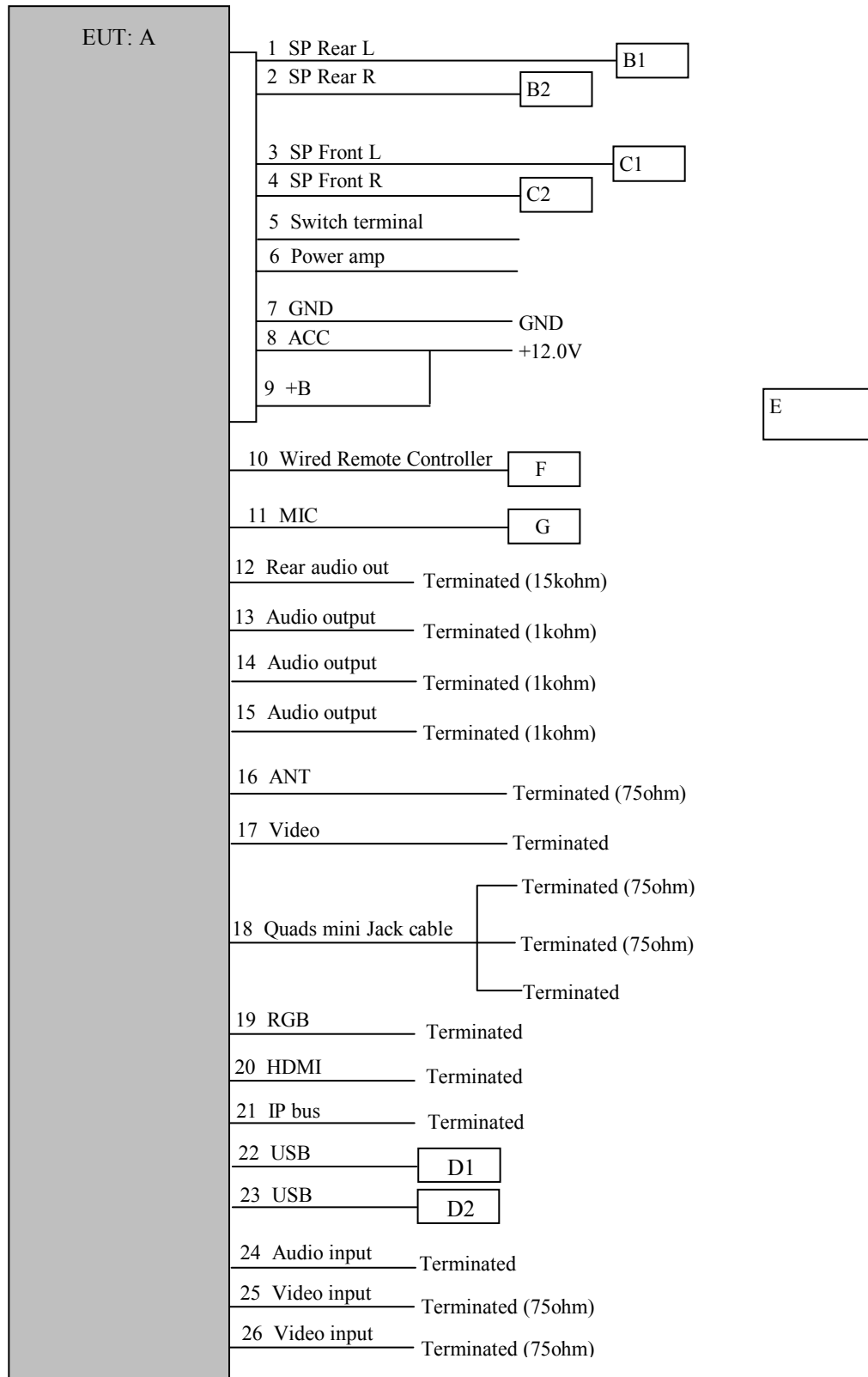
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4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	DVD RDS AV RECEIVER	AVH-X8500BHS	LHTM000013UC *1) LHTM000016UC *2)	PIONEER	EUT
B1	Speaker	KFC-RS160	-	KENWOOD	-
B2	Speaker	KFC-RS160	-	KENWOOD	-
C1	Speaker	TS-X180	D56GHL2	PIONEER	-
C2	Speaker	TS-X180	D56GHL2	PIONEER	-
D1	USB Memory	DT101 G2	-	Kingston	-
D2	USB Memory	DT101 G2	-	Kingston	-
E	Remote Controller	CD-R33	-	PIONEER	-
F	Wired Remote Controller	RM-X2S	-	SONY	-
G	HF-MIC	-	-	PIONEER	-

*1) Used for Antenna terminal conducted tests.

*2) Used for Radiated emission tests.

List of cables used

No.	Cable name	Length (m)	Shield		Remark
			Cable	Connector	
1	SP Rear L	0.15+1.8	Unshielded	Unshielded	-
2	SP Rear R	0.15+1.8	Unshielded	Unshielded	-
3	SP Front L	0.15+4.6	Unshielded	Unshielded	-
4	SP Front R	0.15+4.6	Unshielded	Unshielded	-
5	Switch terminal	0.15+1.0	Unshielded	Unshielded	-
6	Power amp	0.15+1.0	Unshielded	Unshielded	-
7	GND	0.15+2.2	Unshielded	Unshielded	-
8	ACC	0.15+2.2	Unshielded	Unshielded	-
9	+B	0.15+2.2	Unshielded	Unshielded	-
10	Wired Remote Controller	2.0	Shielded	Shielded	-
11	MIC	4.0	Shielded	Shielded	-
12	Rear audio out	1.5	Shielded	Shielded	-
13	Audio out	6.1	Shielded	Shielded	-
14	Audio out	6.1	Shielded	Shielded	-
15	Audio out	3.1	Shielded	Shielded	-
16	ANT	0.2	Shielded	Shielded	-
17	Video	6.1	Shielded	Shielded	-
18	Quads mini Jack	2.0	Shielded	Shielded	-
19	RGB	0.6	Shielded	Shielded	-
20	HDMI	2.2	Shielded	Shielded	-
21	IP bus	1.1	Shielded	Shielded	-
22	USB	1.5	Shielded	Shielded	-
23	USB	1.5	Shielded	Shielded	-
24	Audio input	1.6	Shielded	Shielded	-
25	Video input	6.1	Shielded	Shielded	-
26	Video input	1.6	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

The test was carried out in No. 1, 2 and 3 Semi-Anechoic Chamber.

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 2.0m, raised 0.8m above the conducting ground plane.

The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.

The rear of EUT, including its peripherals was aligned and flushed with rear of tabletop. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Photographs of the set up are shown in APPENDIX.

11.3 Test conditions

Frequency range : 30MHz to 25GHz
Test distance : 3m (below 15GHz) / 1m (above 15GHz)
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.

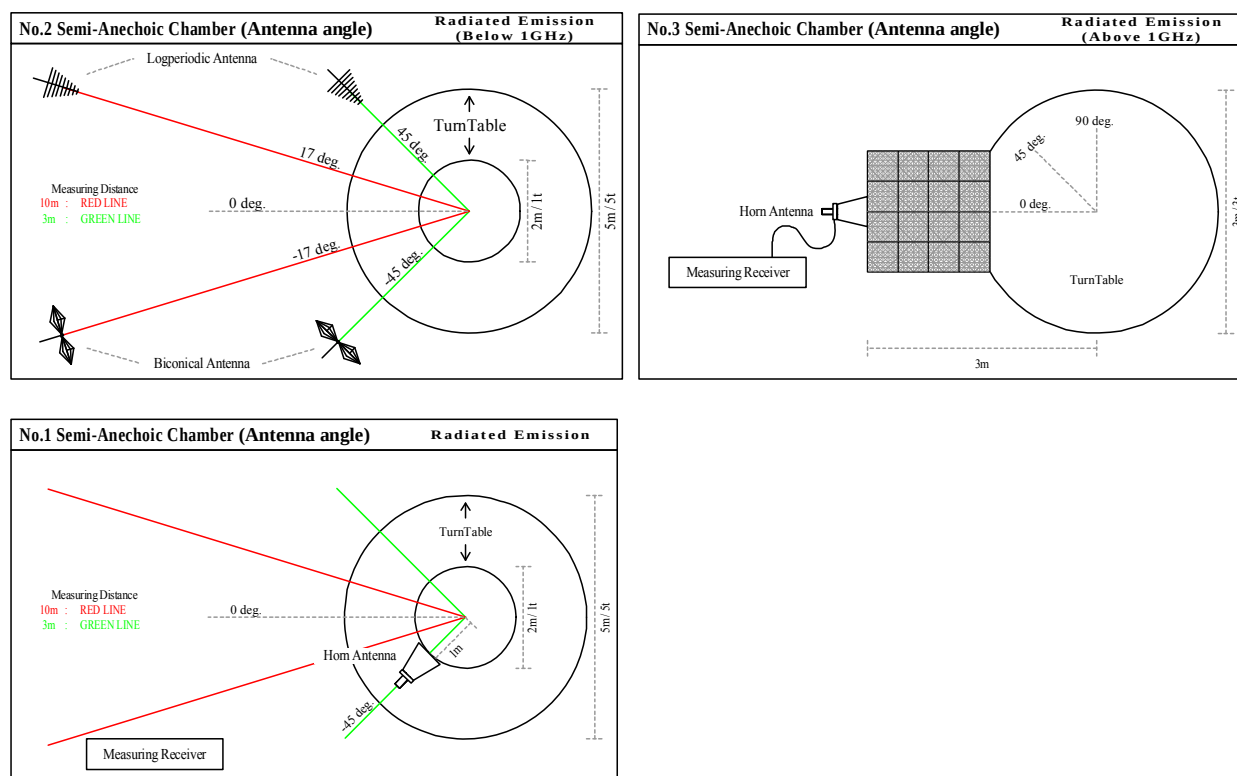
The radiated emission measurements were made with the following detection of the test receiver.

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 confirmed at angle of 0 to 30 deg. based on the product specification to see the position of maximum noise, and the test was made at the position (0 deg.) that has the maximum noise.

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

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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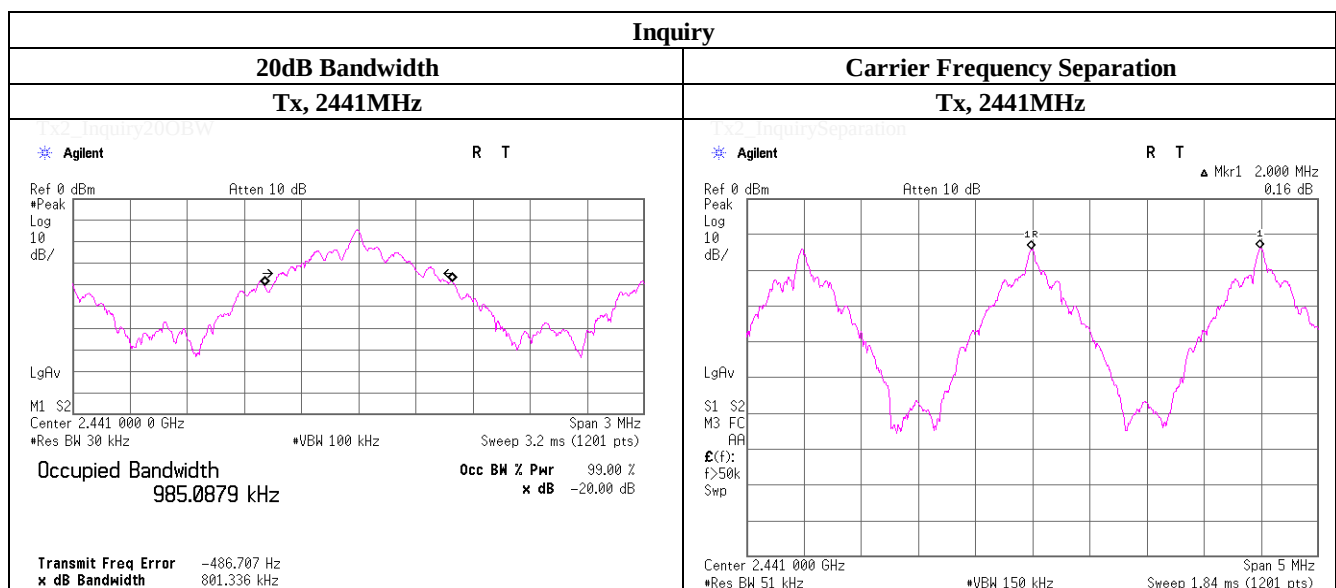
20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.2 Shielded Room
Date	November 11, 2012	
Temperature / Humidity	21 deg.C , 34 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.926	1.000	>= 0.617
DH5	2441.0	0.925	1.000	>= 0.616
DH5	2480.0	0.929	1.000	>= 0.620
Inquiry	2441.0	0.801	2.000	>= 0.534

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

No limit applies to 20dB Bandwidth.



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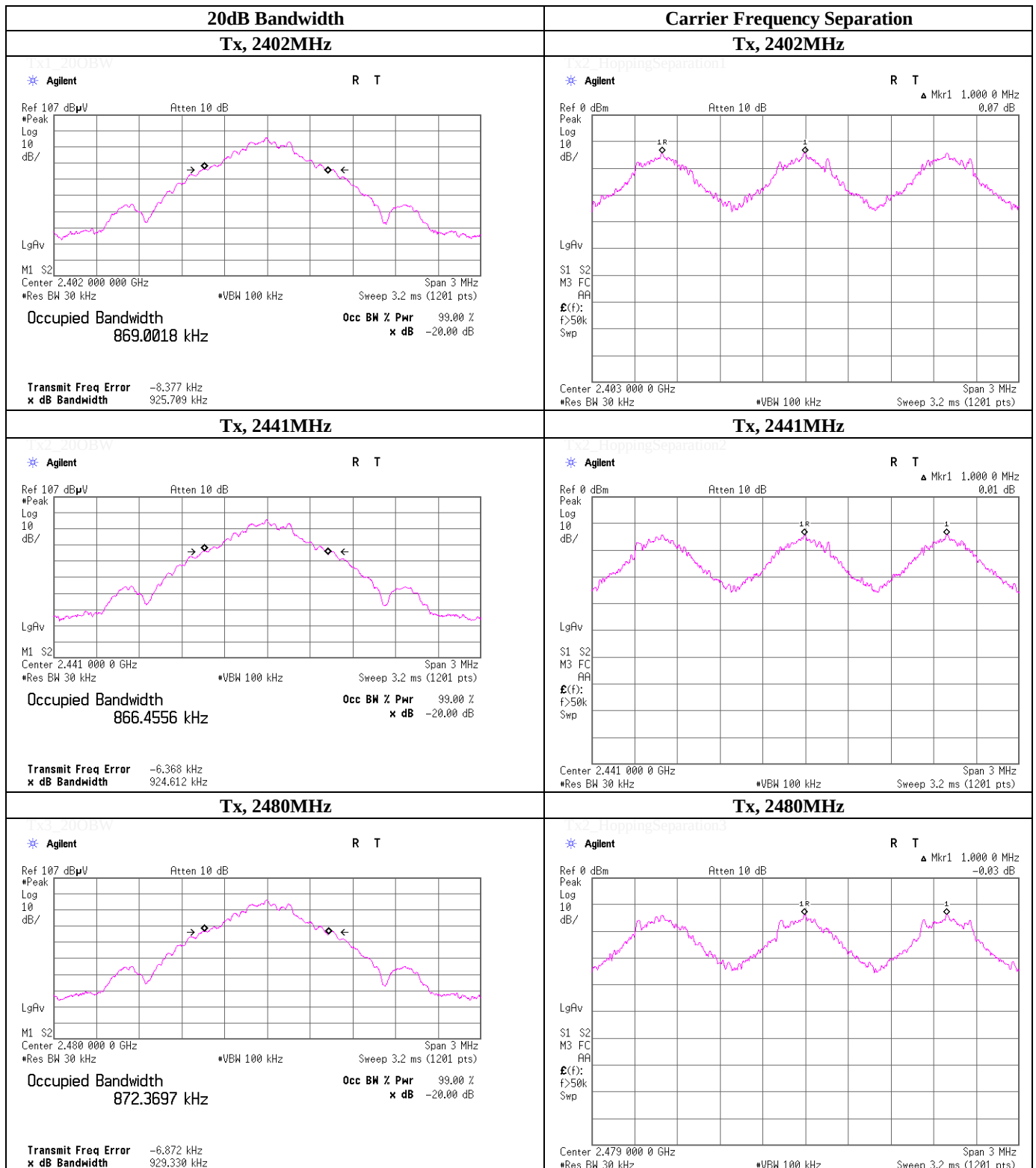
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9



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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date November 11, 2012
Temperature / Humidity 21 deg.C , 34 %RH
Engineer Akio Hayashi
Mode Tx, Bluetooth, EDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.288	1.000	>= 0.859
3-DH5	2441.0	1.289	1.000	>= 0.859
3-DH5	2480.0	1.287	1.000	>= 0.858

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

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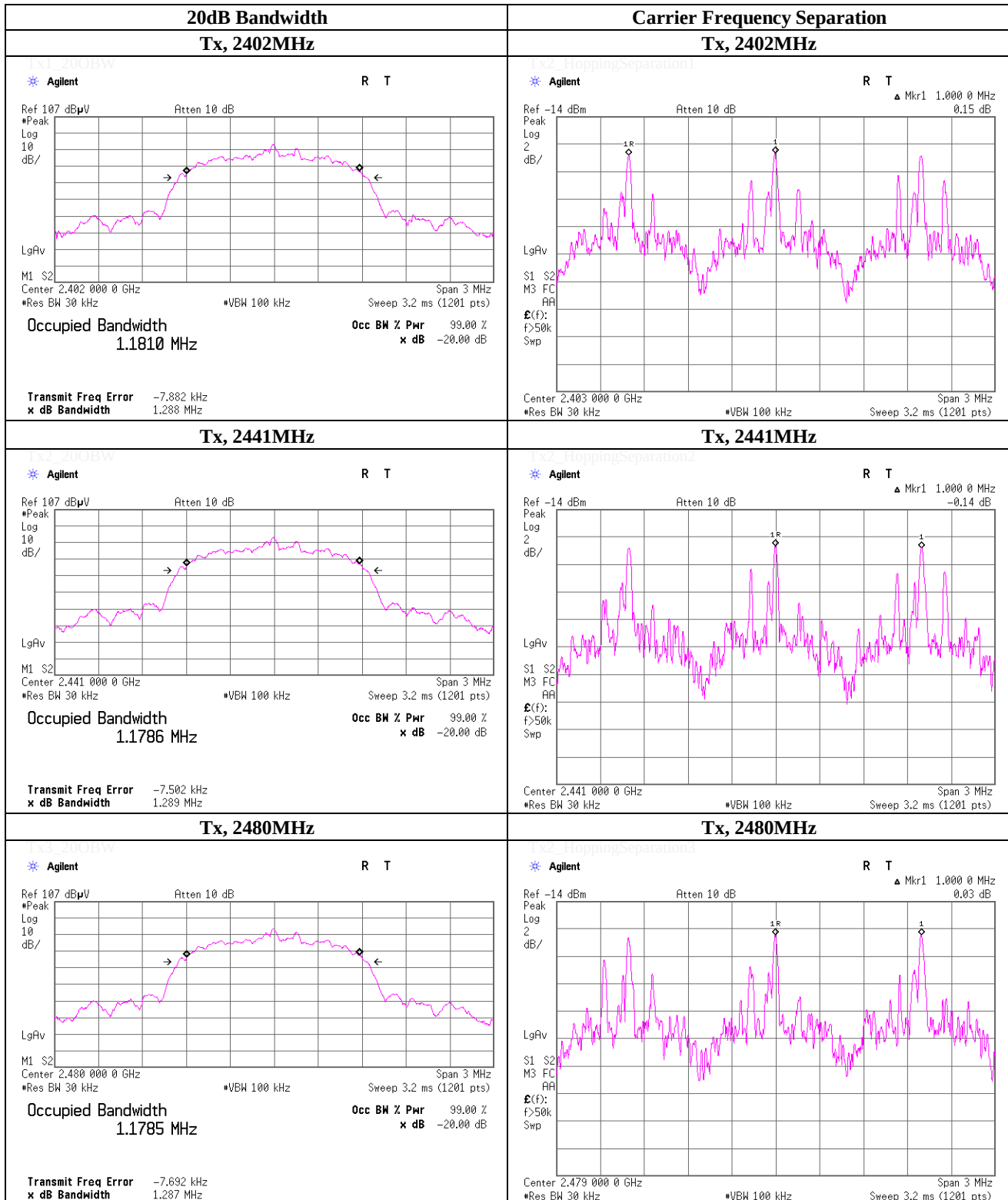
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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



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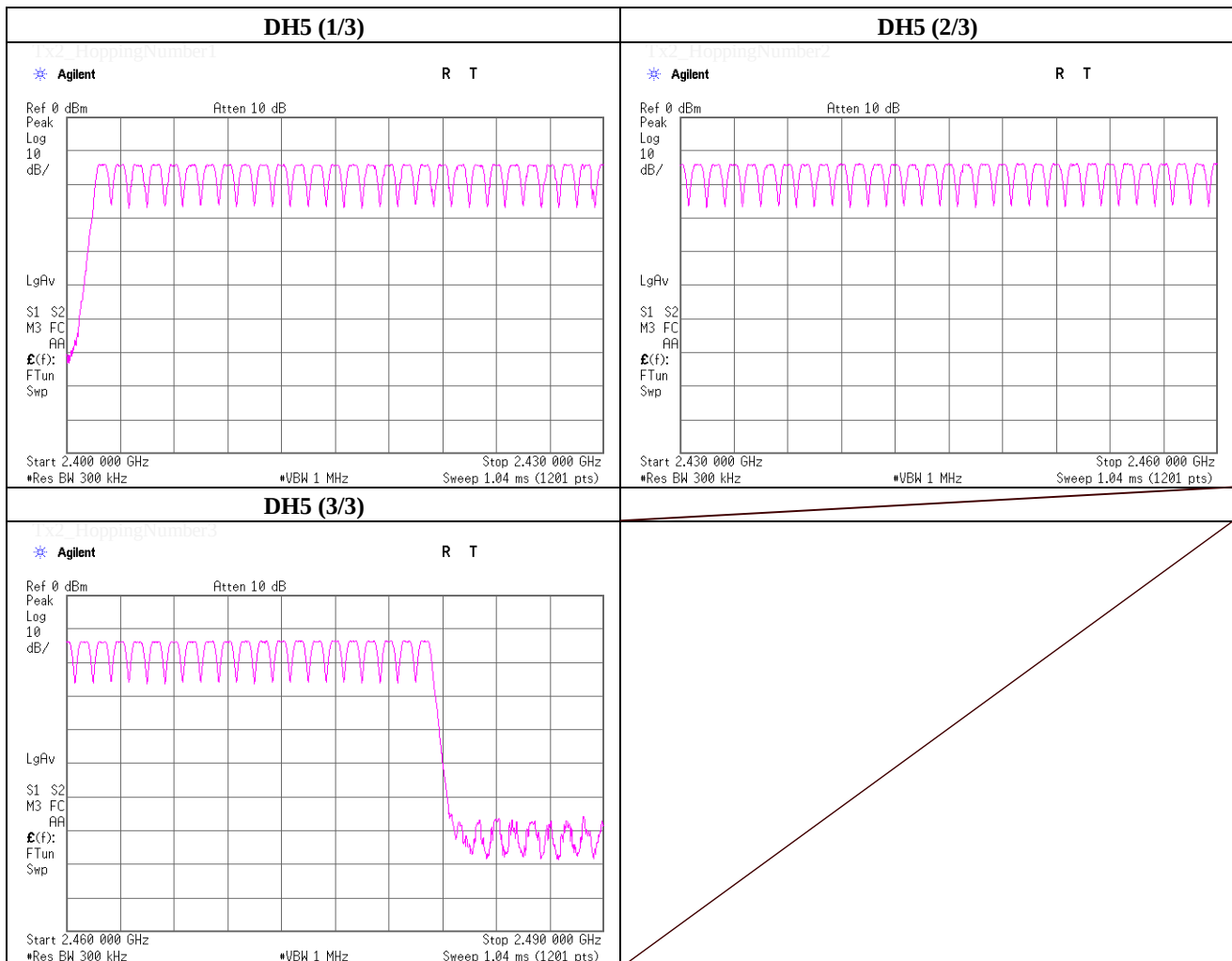
Number of Hopping Frequency

Test place UL Japan, Inc. Shonan EMC Lab.
 Date November 11, 2012
 Temperature / Humidity 21 deg.C , 34 %RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth, BDR, PRBS9

No.2 Shielded Room

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

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



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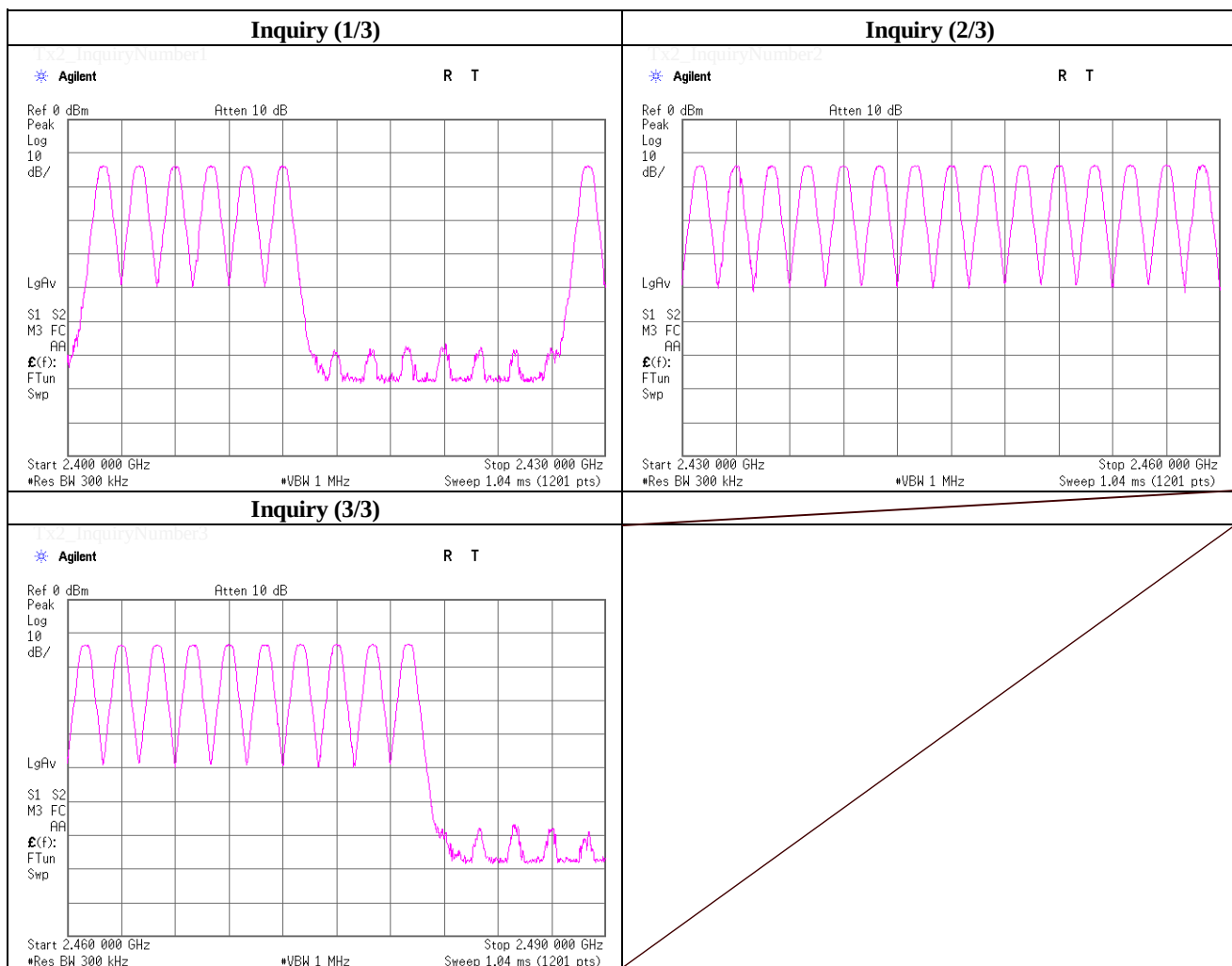
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Number of Hopping Frequency

Test place UL Japan, Inc. Shonan EMC Lab.
 Date November 11, 2012
 Temperature / Humidity 21 deg.C , 34 %RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth, Inquiry

No.2 Shielded Room

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



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Shonan EMC Lab.

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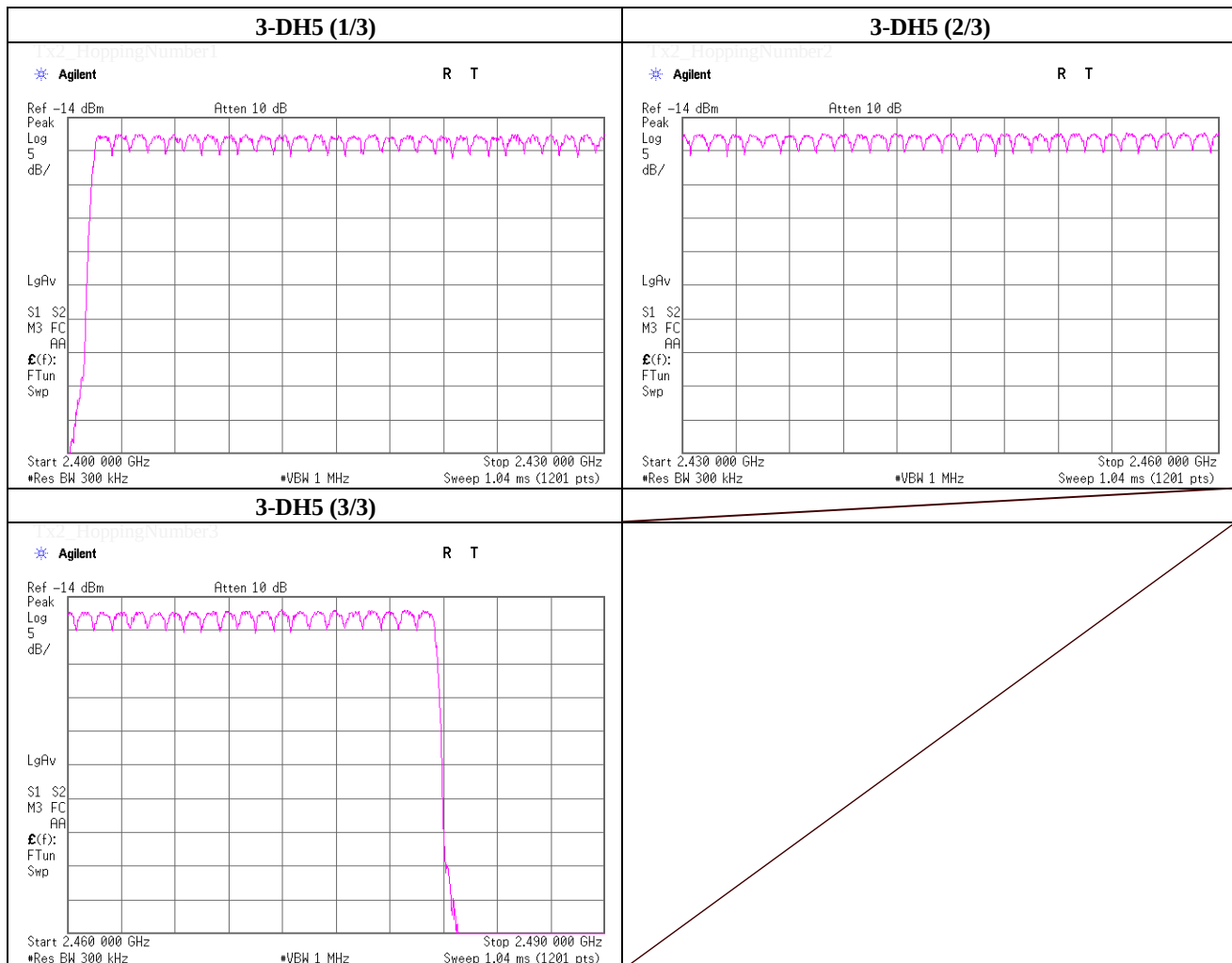
Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.2 Shielded Room
Date	November 11, 2012	
Temperature / Humidity	21 deg.C , 34 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, EDR, PRBS9	

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

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



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
 Date November 11, 2012
 Temperature / Humidity 21 deg.C , 34 %RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth, BDR, PRBS9

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period		Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	18.0	/ 5.0 sec. x 31.6 sec. = 114 times	0.398	45	400
DH3	17.2	/ 5.0 sec. x 31.6 sec. = 109 times	1.655	180	400
DH5	16.8	/ 5.0 sec. x 31.6 sec. = 107 times	2.903	311	400
Inquiry	100.0	/ 1.0 sec. x 12.8 sec. = 1280 times	0.100	128	400

Sample Calculation

Result = Number of transmission x Length of transmission time

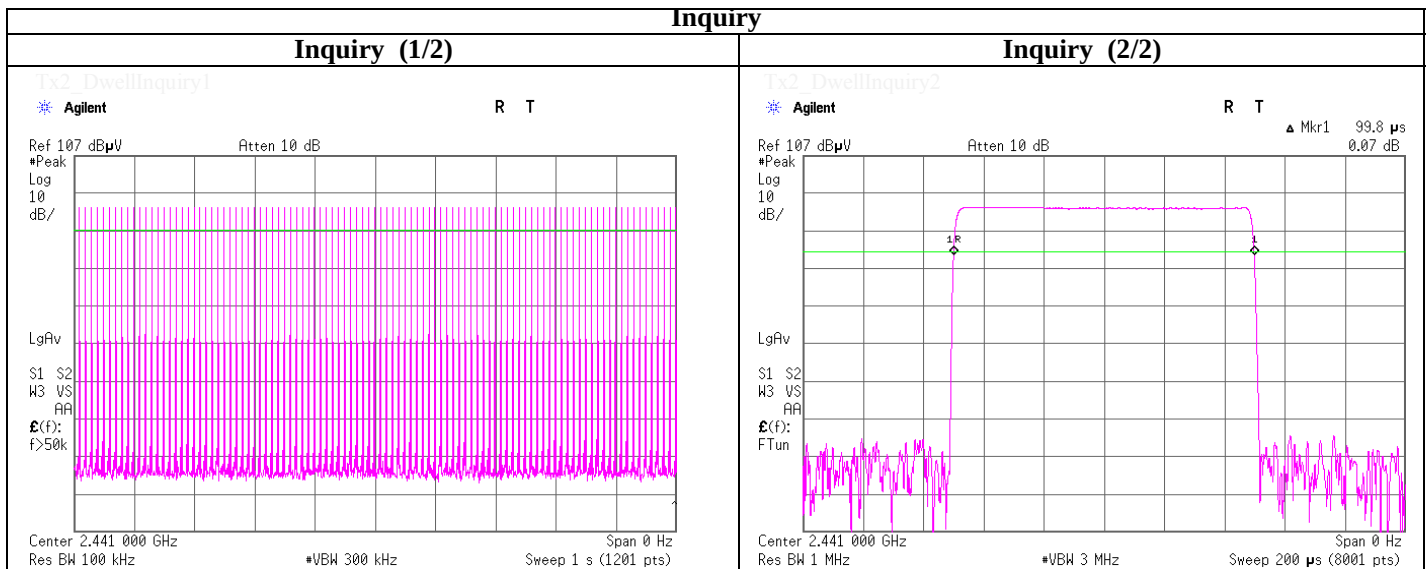
*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	15	15	20	22	18	18.0
DH3	16	18	18	16	18	17.2
DH5	14	17	19	18	16	16.8

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

* 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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Shonan EMC Lab.

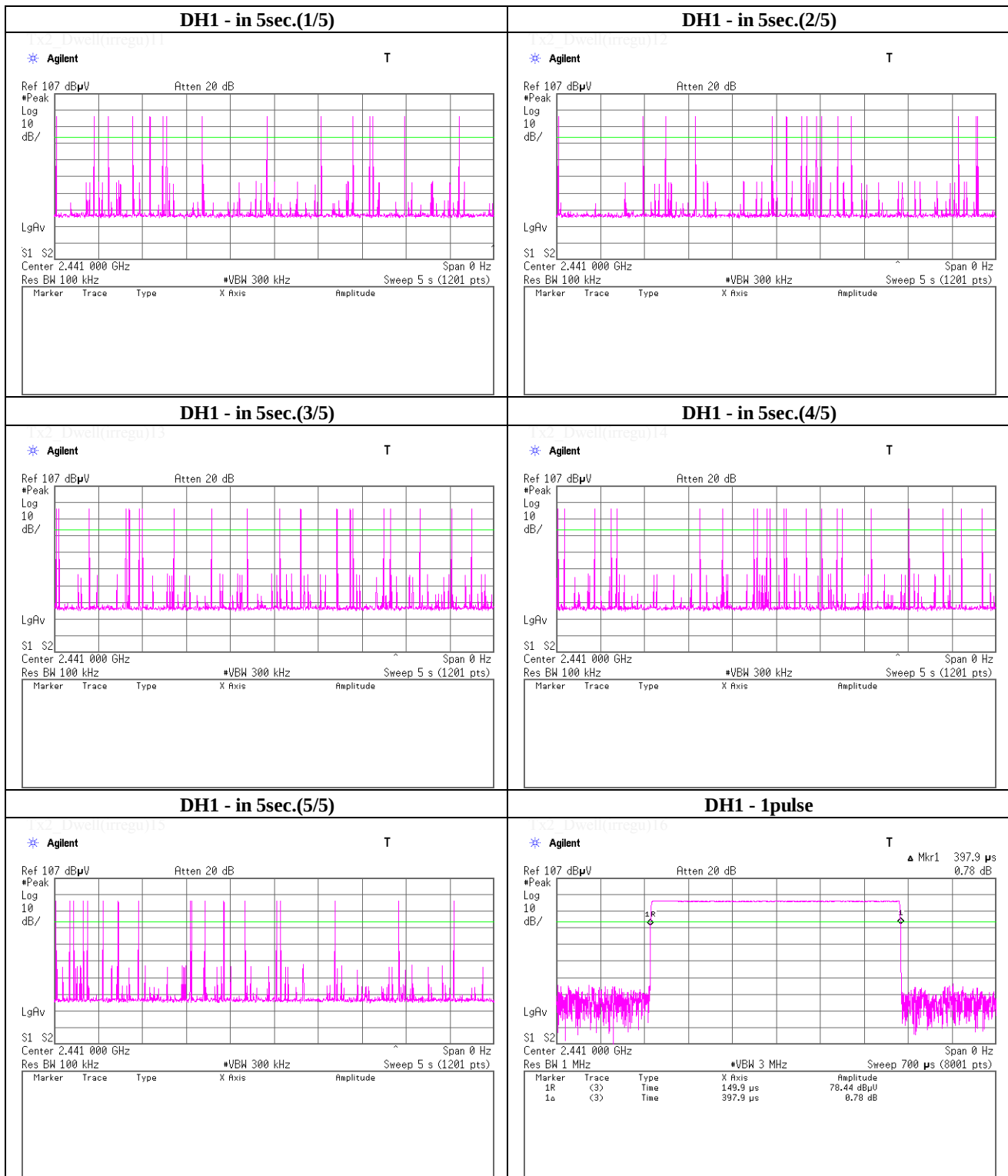
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Dwell time

Tx, Bluetooth, BDR, PRBS9



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Shonan EMC Lab.

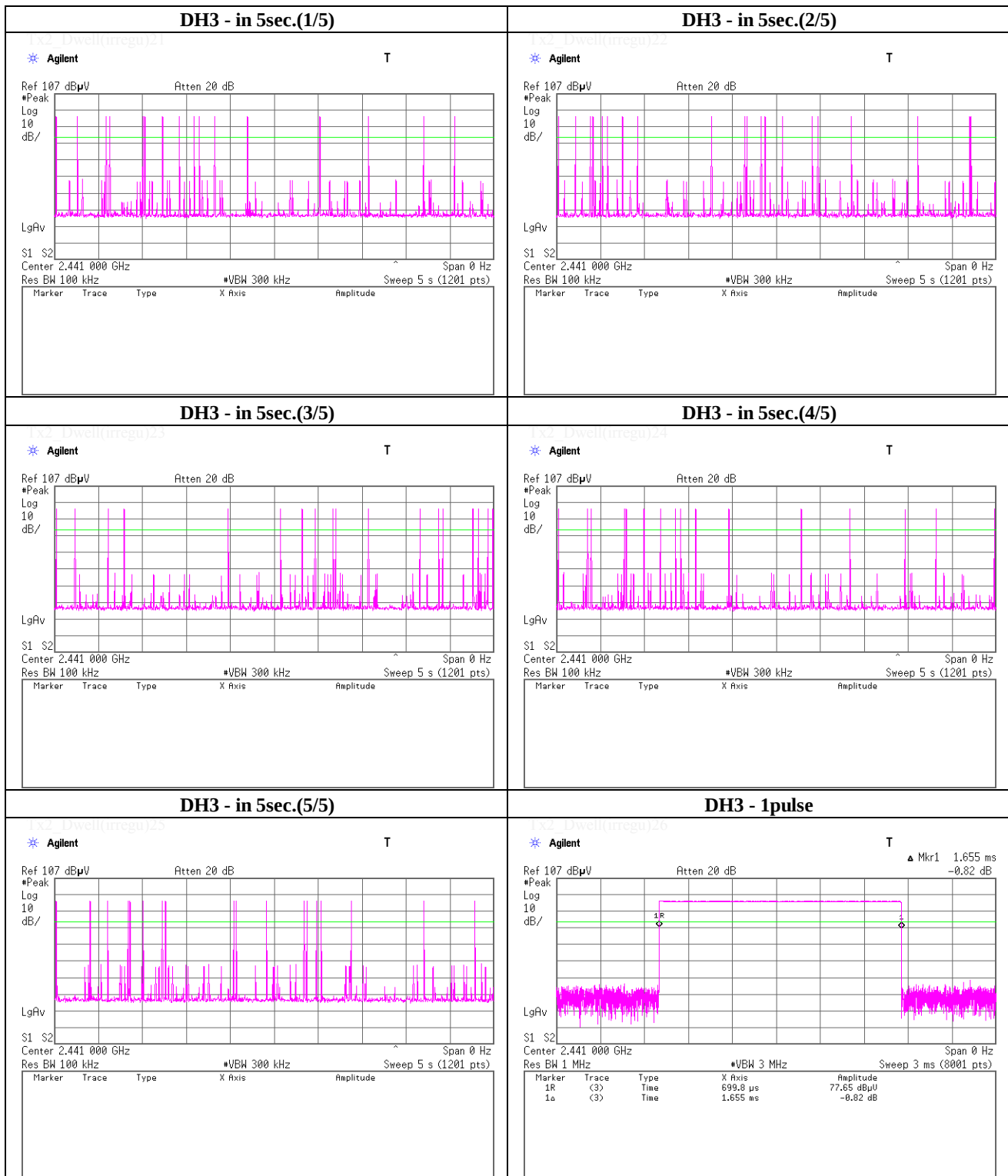
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

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Dwell time

Tx, Bluetooth, BDR, PRBS9



UL Japan, Inc.

Shonan EMC Lab.

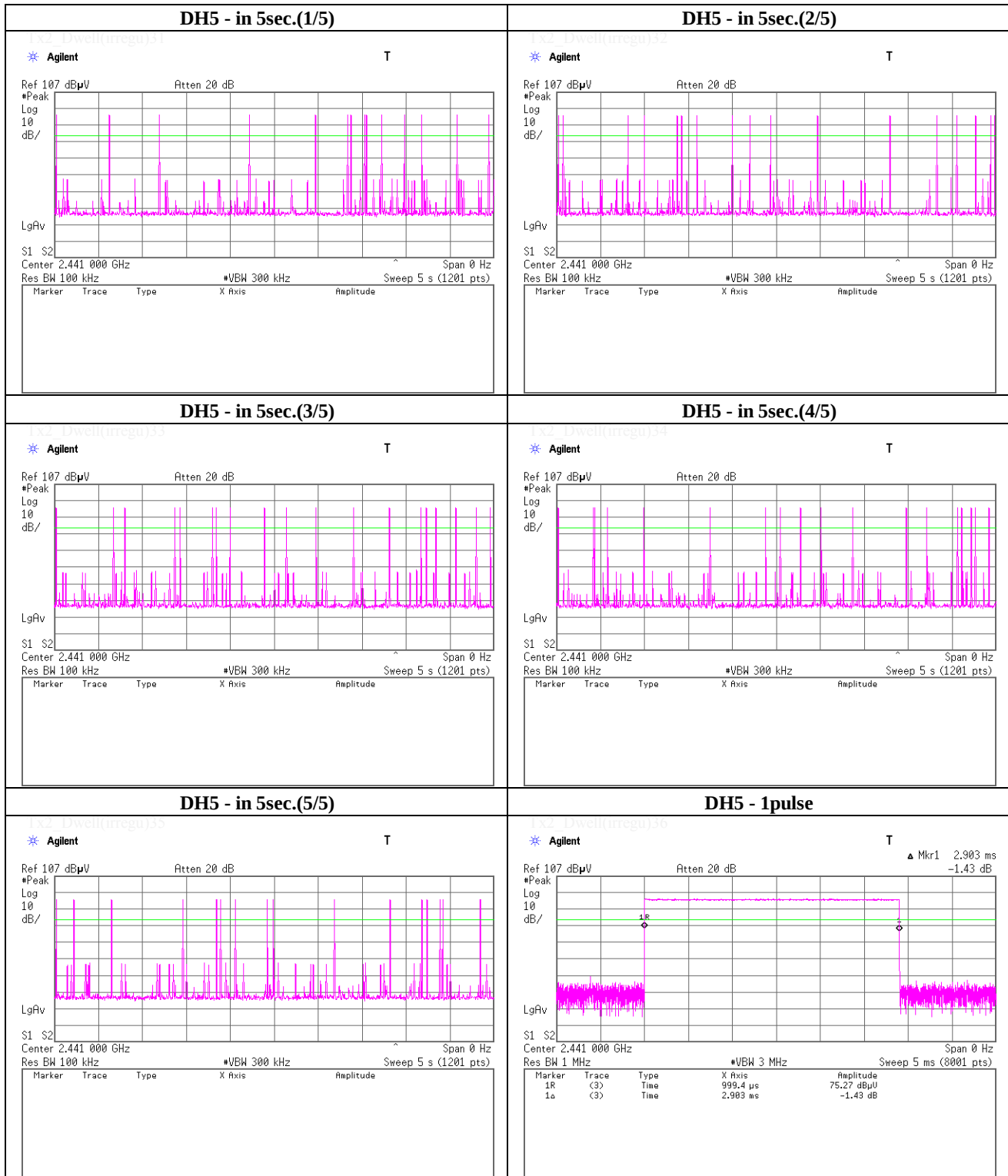
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Dwell time

Tx, Bluetooth, BDR, PRBS9



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
 Date November 11, 2012
 Temperature / Humidity 21 deg.C , 34 %RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth, EDR, PRBS9

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4) second			Length of transmission time [msec]	Result [msec]	Limit [msec]
3-DH1	21.0	/ 5.0 sec.	x 31.6 sec. = 133 times	0.408	54	400
3-DH3	20.6	/ 5.0 sec.	x 31.6 sec. = 131 times	1.659	217	400
3-DH5	19.4	/ 5.0 sec.	x 31.6 sec. = 123 times	2.911	358	400

Sample Calculation

Result = Number of transmission x Length of transmission time

*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
3-DH1	22	23	23	20	17	21.0
3-DH3	22	18	22	22	19	20.6
3-DH5	19	18	21	20	19	19.4

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

* 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.

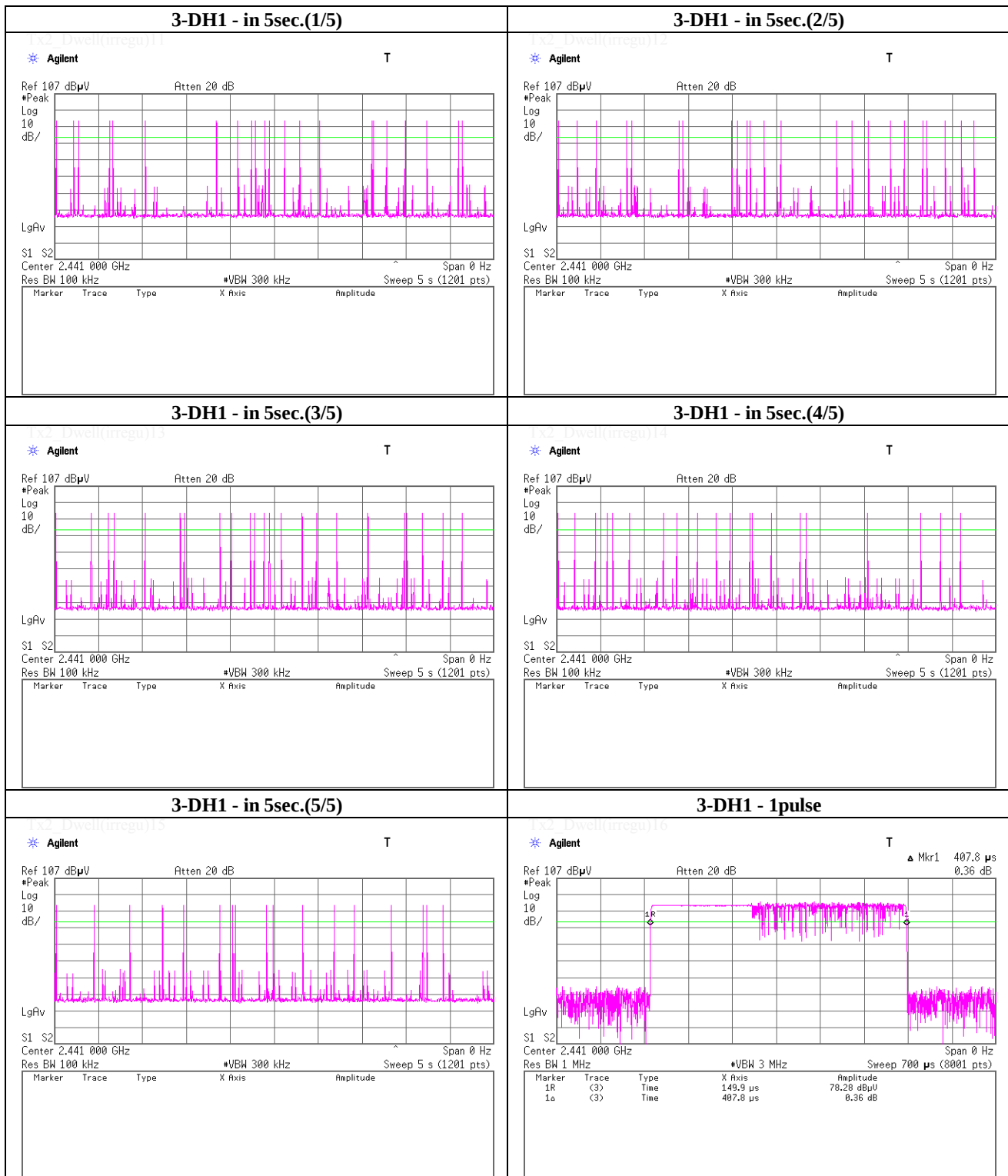
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Dwell time

Tx, Bluetooth, EDR, PRBS9



UL Japan, Inc.

Shonan EMC Lab.

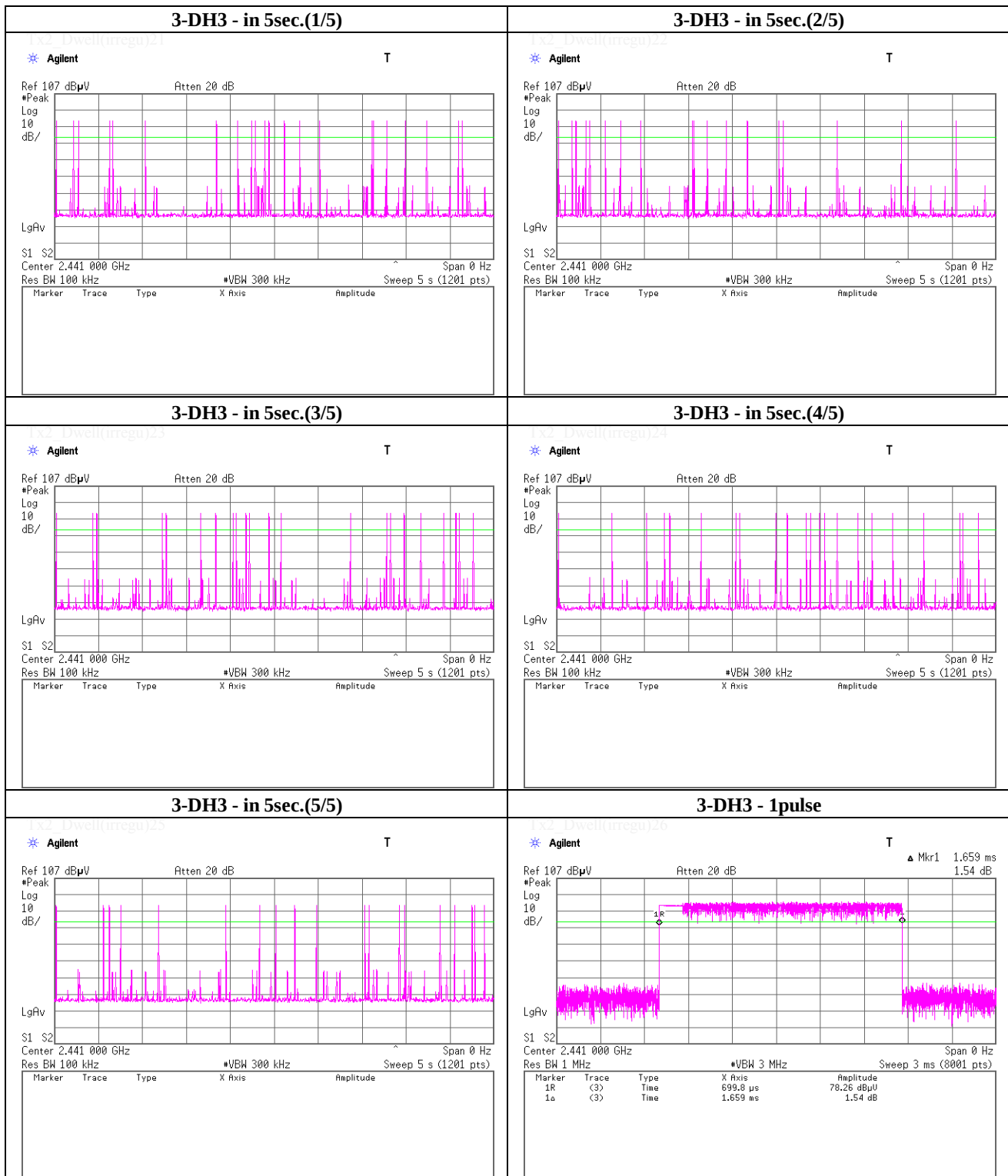
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Telephone : +81 463 50 6400

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Dwell time

Tx, Bluetooth, EDR, PRBS9



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Shonan EMC Lab.

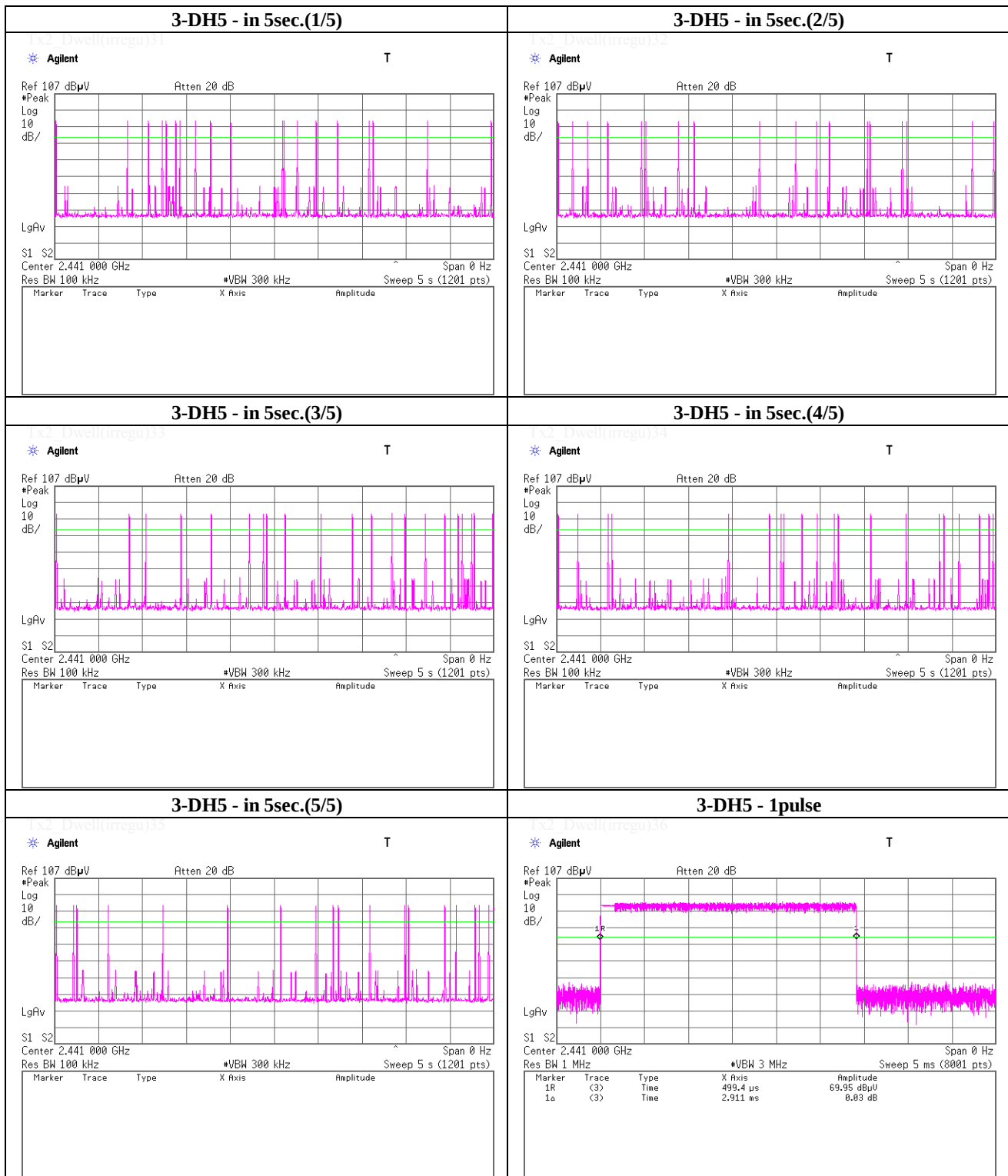
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Telephone : +81 463 50 6400

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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.2 Shielded Room
 Date November 11, 2012
 Temperature / Humidity 21 deg.C , 34 %RH
 Engineer Akio Hayashi
 Mode Tx, Bluetooth

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

	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-13.66	1.58	10.00	-2.08	0.62	20.97	125	23.05
DH5	2441.0	-13.58	1.59	10.00	-1.99	0.63	20.97	125	22.96
DH5	2480.0	-13.24	1.60	10.00	-1.64	0.69	20.97	125	22.61
2-DH5	2402.0	-14.18	1.58	10.00	-2.60	0.55	20.97	125	23.57
2-DH5	2441.0	-14.13	1.59	10.00	-2.54	0.56	20.97	125	23.51
2-DH5	2480.0	-13.73	1.60	10.00	-2.13	0.61	20.97	125	23.10
3-DH5	2402.0	-13.79	1.58	10.00	-2.21	0.60	20.97	125	23.18
3-DH5	2441.0	-13.71	1.59	10.00	-2.12	0.61	20.97	125	23.09
3-DH5	2480.0	-13.22	1.60	10.00	-1.62	0.69	20.97	125	22.59

Sample Calculation:

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

UL Japan, Inc.
Shonan EMC Lab.

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1, 2 and No.3 Semi Anechoic Chamber
Date November 12, 2012 November 13, 2012 November 14, 2012
Temperature / Humidity 25 deg.C , 55 %RH 22 deg.C , 53 %RH 22 deg.C , 47 %RH
Engineer Takahiro Suzuki
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.	64.153	QP	42.8	7.3	7.0	31.9	25.2	40.0	14.8	300	232	
Hori.	216.003	QP	45.1	16.6	9.6	31.8	39.5	46.0	6.5	155	73	
Hori.	243.003	QP	45.5	16.9	10.1	31.7	40.8	46.0	5.2	192	151	
Hori.	2390.000	PK	49.6	27.4	14.2	41.4	49.8	73.9	24.1	100	218	
Hori.	3997.503	PK	57.1	29.7	6.2	41.8	51.2	73.9	22.7	111	332	
Hori.	4804.000	PK	48.6	31.1	6.8	41.2	45.3	73.9	28.6	100	0	
Hori.	7206.000	PK	49.2	36.6	8.3	41.4	52.7	73.9	21.2	100	0	
Hori.	9608.000	PK	48.3	38.5	9.4	38.9	57.3	73.9	16.6	100	0	
Hori.	12010.000	PK	46.6	39.4	10.7	39.4	57.3	73.9	16.6	100	0	
Hori.	2390.000	AV	34.6	27.4	14.2	41.4	34.8	53.9	19.1	100	218	
Hori.	4804.000	AV	34.5	31.1	6.8	41.2	31.2	53.9	22.7	100	0	
Hori.	7206.000	AV	36.0	36.6	8.3	41.4	39.5	53.9	14.4	100	0	
Hori.	9608.000	AV	33.1	38.5	9.4	38.9	42.1	53.9	11.8	100	0	
Hori.	12010.000	AV	33.4	39.4	10.7	39.4	44.1	53.9	9.8	100	0	
Vert.	129.827	QP	45.3	13.7	8.4	31.9	35.5	43.5	8.0	100	215	
Vert.	148.498	QP	45.5	14.8	8.7	31.8	37.2	43.5	6.3	100	90	
Vert.	866.692	QP	40.0	21.7	9.9	31.1	40.5	46.0	5.5	100	37	
Vert.	2390.000	PK	49.3	27.4	14.2	41.4	49.5	73.9	24.4	107	46	
Vert.	3997.503	PK	57.1	29.7	6.2	41.8	51.2	73.9	22.7	111	332	
Vert.	4804.000	PK	47.8	31.1	6.8	41.2	44.5	73.9	29.4	100	0	
Vert.	7206.000	PK	50.5	36.6	8.3	41.4	54.0	73.9	19.9	100	0	
Vert.	9608.000	PK	48.4	38.5	9.4	38.9	57.4	73.9	16.5	100	0	
Vert.	12010.000	PK	48.1	39.4	10.7	39.4	58.8	73.9	15.1	100	0	
Vert.	2390.000	AV	34.5	27.4	14.2	41.4	34.7	53.9	19.2	107	46	
Vert.	4804.000	AV	34.5	31.1	6.8	41.2	31.2	53.9	22.7	100	0	
Vert.	7206.000	AV	35.4	36.6	8.3	41.4	38.9	53.9	15.0	100	0	
Vert.	9608.000	AV	33.6	38.5	9.4	38.9	42.6	53.9	11.3	100	0	
Vert.	12010.000	AV	33.7	39.4	10.7	39.4	44.4	53.9	9.5	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	3997.503	AV	53.9	29.7	6.2	41.8	-24.7	23.3	53.9	30.6	111	332	
Vert.	3997.503	AV	53.9	29.7	6.2	41.8	-24.7	23.3	53.9	30.6	100	0	

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

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

*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

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	84.8	27.4	14.2	41.4	85.0	-	-	Carrier
Hori.	2400.000	PK	40.2	27.4	14.2	41.4	40.4	65.0	24.6	
Vert.	2402.000	PK	85.7	27.4	14.2	41.4	85.9	-	-	Carrier
Vert.	2400.000	PK	39.4	27.4	14.2	41.4	39.6	65.9	26.3	

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

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1, 2 and No.3 Semi Anechoic Chamber
Date November 12, 2012 November 13, 2012 November 14, 2012
Temperature / Humidity 25 deg.C , 55 %RH 22 deg.C , 53 %RH 22 deg.C , 47 %RH
Engineer Takahiro Suzuki
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.	242.998	QP	45.4	16.9	10.1	31.7	40.7	46.0	5.3	237	155	
Hori.	266.673	QP	43.7	17.7	10.5	31.7	40.2	46.0	5.8	202	98	
Hori.	431.996	QP	47.6	16.7	7.8	31.7	40.4	46.0	5.6	100	83	
Hori.	3994.132	PK	56.3	29.7	6.2	41.8	50.4	73.9	23.5	109	64	
Hori.	4882.000	PK	46.3	31.3	6.9	41.1	43.4	73.9	30.5	100	0	
Hori.	7323.000	PK	47.8	36.6	8.6	41.4	51.6	73.9	22.3	100	0	
Hori.	9764.000	PK	44.8	38.7	9.5	38.9	54.1	73.9	19.8	100	0	
Hori.	12205.000	PK	44.4	39.5	10.8	39.3	55.4	73.9	18.5	100	0	
Hori.	4882.000	AV	35.0	31.3	6.9	41.1	32.1	53.9	21.8	100	0	
Hori.	7323.000	AV	34.9	36.6	8.6	41.4	38.7	53.9	15.2	100	0	
Hori.	9764.000	AV	33.1	38.7	9.5	38.9	42.4	53.9	11.5	100	0	
Hori.	12205.000	AV	33.7	39.5	10.8	39.3	44.7	53.9	9.2	100	0	
Vert.	297.003	QP	40.6	18.9	10.9	31.7	38.7	46.0	7.3	100	132	
Vert.	833.342	QP	39.0	21.2	9.8	31.3	38.7	46.0	7.3	100	50	
Vert.	866.681	QP	39.9	21.7	9.9	31.1	40.4	46.0	5.6	100	13	
Vert.	3995.339	PK	55.3	29.7	6.2	41.8	49.4	73.9	24.5	130	313	
Vert.	4882.000	PK	46.3	31.3	6.9	41.1	43.4	73.9	30.5	100	0	
Vert.	7323.000	PK	47.8	36.6	8.6	41.4	51.6	73.9	22.3	100	0	
Vert.	9764.000	PK	43.1	38.7	9.5	38.9	52.4	73.9	21.5	100	0	
Vert.	12205.000	PK	45.7	39.5	10.8	39.3	56.7	73.9	17.2	100	0	
Vert.	4882.000	AV	36.0	31.3	6.9	41.1	33.1	53.9	20.8	100	0	
Vert.	7323.000	AV	35.6	36.6	8.6	41.4	39.4	53.9	14.5	100	0	
Vert.	9764.000	AV	33.7	38.7	9.5	38.9	43.0	53.9	10.9	100	0	
Vert.	12205.000	AV	34.2	39.5	10.8	39.3	45.2	53.9	8.7	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	3994.132	AV	53.4	29.7	6.2	41.8	-24.7	22.8	53.9	31.1	109	64	
Vert.	3995.339	AV	51.8	29.7	6.2	41.8	-24.7	21.2	53.9	32.7	130	313	

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

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

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

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1, 2 and No.3 Semi Anechoic Chamber
Date November 12, 2012 November 13, 2012 November 14, 2012
Temperature / Humidity 25 deg.C , 55 %RH 22 deg.C , 53 %RH 22 deg.C , 47 %RH
Engineer Takahiro Suzuki
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.	243.002	QP	45.6	16.9	10.1	31.7	40.9	46.0	5.1	276	163	
Hori.	266.676	QP	43.8	17.7	10.5	31.7	40.3	46.0	5.7	144	95	
Hori.	432.001	QP	47.6	16.7	7.8	31.7	40.4	46.0	5.6	100	82	
Hori.	2483.500	PK	48.9	27.5	14.3	41.4	49.3	73.9	24.6	120	213	
Hori.	3996.150	PK	56.3	29.7	6.2	41.8	50.4	73.9	23.5	113	51	
Hori.	4960.000	PK	48.2	31.6	6.9	41.0	45.7	73.9	28.2	100	0	
Hori.	7440.000	PK	47.3	36.7	8.8	41.5	51.3	73.9	22.6	100	0	
Hori.	9920.000	PK	44.8	39.0	9.7	38.9	54.6	73.9	19.3	100	0	
Hori.	12400.000	PK	46.5	39.5	10.8	39.3	57.5	73.9	16.4	100	0	
Hori.	2483.500	AV	35.1	27.5	14.3	41.4	35.5	53.9	18.4	120	213	
Hori.	4960.000	AV	35.9	31.6	6.9	41.0	33.4	53.9	20.5	100	0	
Hori.	7440.000	AV	36.0	36.7	8.8	41.5	40.0	53.9	13.9	100	0	
Hori.	9920.000	AV	34.3	39.0	9.7	38.9	44.1	53.9	9.8	100	0	
Hori.	12400.000	AV	34.1	39.5	10.8	39.3	45.1	53.9	8.8	100	0	
Vert.	297.003	QP	40.6	18.9	10.9	31.7	38.7	46.0	7.3	100	119	
Vert.	766.680	QP	38.0	20.6	9.5	31.5	36.6	46.0	9.4	100	3	
Vert.	866.685	QP	40.3	21.7	9.9	31.1	40.8	46.0	5.2	100	35	
Vert.	2483.500	PK	49.4	27.5	14.3	41.4	49.8	73.9	24.1	142	181	
Vert.	3996.150	PK	56.9	29.7	6.2	41.8	51.0	73.9	22.9	106	332	
Vert.	4960.000	PK	47.9	31.6	6.9	41.0	45.4	73.9	28.5	100	0	
Vert.	7440.000	PK	47.5	36.7	8.8	41.5	51.5	73.9	22.4	100	0	
Vert.	9920.000	PK	44.6	39.0	9.7	38.9	54.4	73.9	19.5	100	0	
Vert.	12400.000	PK	45.6	39.5	10.8	39.3	56.6	73.9	17.3	100	0	
Vert.	2483.500	AV	34.9	27.5	14.3	41.4	35.3	53.9	18.6	142	181	
Vert.	4960.000	AV	35.8	31.6	6.9	41.0	33.3	53.9	20.6	100	0	
Vert.	7440.000	AV	36.0	36.7	8.8	41.5	40.0	53.9	13.9	100	0	
Vert.	9920.000	AV	33.9	39.0	9.7	38.9	43.7	53.9	10.2	100	0	
Vert.	12400.000	AV	33.7	39.5	10.8	39.3	44.7	53.9	9.2	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	3996.150	AV	52.9	29.7	6.2	41.8	-24.7	22.3	53.9	31.6	113	51	
Vert.	3996.150	AV	53.8	29.7	6.2	41.8	-24.7	23.2	53.9	30.7	106	332	

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

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

*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

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1, 2 and No.3 Semi Anechoic Chamber
Date November 12, 2012 November 13, 2012 November 14, 2012
Temperature / Humidity 25 deg.C , 55 %RH 22 deg.C , 53 %RH 22 deg.C , 47 %RH
Engineer Takahiro Suzuki
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.	243.004	QP	45.5	16.9	10.1	31.7	40.8	46.0	5.2	245	149	
Hori.	266.677	QP	43.6	17.7	10.5	31.7	40.1	46.0	5.9	144	93	
Hori.	431.999	QP	47.8	16.7	7.8	31.7	40.6	46.0	5.4	100	79	
Hori.	2390.000	PK	49.7	27.4	14.2	41.4	49.9	73.9	24.0	100	221	
Hori.	3993.787	PK	56.3	29.7	6.2	41.8	50.4	73.9	23.5	114	50	
Hori.	4804.000	PK	48.5	31.1	6.8	41.2	45.2	73.9	28.7	100	0	
Hori.	7206.000	PK	49.3	36.6	8.3	41.4	52.8	73.9	21.1	100	0	
Hori.	9608.000	PK	48.5	38.5	9.4	38.9	57.5	73.9	16.4	100	0	
Hori.	12010.000	PK	46.8	39.4	10.7	39.4	57.5	73.9	16.4	100	0	
Hori.	2390.000	AV	34.5	27.4	14.2	41.4	34.7	53.9	19.2	100	221	
Hori.	4804.000	AV	34.6	31.1	6.8	41.2	31.3	53.9	22.6	100	0	
Hori.	7206.000	AV	36.2	36.6	8.3	41.4	39.7	53.9	14.2	100	0	
Hori.	9608.000	AV	33.0	38.5	9.4	38.9	42.0	53.9	11.9	100	0	
Hori.	12010.000	AV	33.5	39.4	10.7	39.4	44.2	53.9	9.7	100	0	
Vert.	297.000	QP	40.6	18.9	10.9	31.7	38.7	46.0	7.3	100	121	
Vert.	866.682	QP	39.8	21.7	9.9	31.1	40.3	46.0	5.7	100	45	
Vert.	900.018	QP	38.5	22.1	10.1	31.0	39.7	46.0	6.3	100	64	
Vert.	2390.000	PK	48.4	27.4	14.2	41.4	48.6	73.9	25.3	100	0	
Vert.	3993.787	PK	56.8	29.7	6.2	41.8	50.9	73.9	23.0	109	331	
Vert.	4804.000	PK	47.6	31.1	6.8	41.2	44.3	73.9	29.6	100	0	
Vert.	7206.000	PK	50.3	36.6	8.3	41.4	53.8	73.9	20.1	100	0	
Vert.	9608.000	PK	48.5	38.5	9.4	38.9	57.5	73.9	16.4	100	0	
Vert.	12010.000	PK	48.3	39.4	10.7	39.4	59.0	73.9	14.9	100	0	
Vert.	2390.000	AV	34.4	27.4	14.2	41.4	34.6	53.9	19.3	100	0	
Vert.	4804.000	AV	34.4	31.1	6.8	41.2	31.1	53.9	22.8	100	0	
Vert.	7206.000	AV	35.5	36.6	8.3	41.4	39.0	53.9	14.9	100	0	
Vert.	9608.000	AV	33.4	38.5	9.4	38.9	42.4	53.9	11.5	100	0	
Vert.	12010.000	AV	33.5	39.4	10.7	39.4	44.2	53.9	9.7	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	3993.787	AV	53.2	29.7	6.2	41.8	-24.7	22.6	53.9	31.3	114	50	
Vert.	3993.787	AV	53.2	29.7	6.2	41.8	-24.7	22.6	53.9	31.3	109	331	

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

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

*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

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	82.2	27.4	14.2	41.4	82.4	-	-	Carrier
Hori.	2400.000	PK	39.2	27.4	14.2	41.4	39.4	62.4	23.0	
Vert.	2402.000	PK	81.8	27.4	14.2	41.4	82.0	-	-	Carrier
Vert.	2400.000	PK	38.7	27.4	14.2	41.4	38.9	62.0	23.1	

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

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1, 2 and No.3 Semi Anechoic Chamber
Date November 12, 2012 November 13, 2012 November 14, 2012
Temperature / Humidity 25 deg.C , 55 %RH 22 deg.C , 53 %RH 22 deg.C , 47 %RH
Engineer Takahiro Suzuki
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.	243.001	QP	45.4	16.9	10.1	31.7	40.7	46.0	5.3	210	148	
Hori.	266.679	QP	43.8	17.7	10.5	31.7	40.3	46.0	5.7	146	97	
Hori.	432.002	QP	47.7	16.7	7.8	31.7	40.5	46.0	5.5	100	139	
Hori.	3993.764	PK	55.9	29.7	6.2	41.8	50.0	73.9	23.9	110	51	
Hori.	4882.000	PK	46.2	31.3	6.9	41.1	43.3	73.9	30.6	100	0	
Hori.	7323.000	PK	47.9	36.6	8.6	41.4	51.7	73.9	22.2	100	0	
Hori.	9764.000	PK	44.6	38.7	9.5	38.9	53.9	73.9	20.0	100	0	
Hori.	12205.000	PK	44.7	39.5	10.8	39.3	55.7	73.9	18.2	100	0	
Hori.	4882.000	AV	35.2	31.3	6.9	41.1	32.3	53.9	21.6	100	0	
Hori.	7323.000	AV	35.0	36.6	8.6	41.4	38.8	53.9	15.1	100	0	
Hori.	9764.000	AV	33.3	38.7	9.5	38.9	42.6	53.9	11.3	100	0	
Hori.	12205.000	AV	33.5	39.5	10.8	39.3	44.5	53.9	9.4	100	0	
Vert.	296.997	QP	40.3	18.9	10.9	31.7	38.4	46.0	7.6	100	119	
Vert.	800.009	QP	39.6	20.8	9.6	31.4	38.6	46.0	7.4	106	54	
Vert.	900.017	QP	38.4	22.1	10.1	31.0	39.6	46.0	6.4	105	59	
Vert.	3993.764	PK	56.6	29.7	6.2	41.8	50.7	73.9	23.2	138	332	
Vert.	4882.000	PK	46.1	31.3	6.9	41.1	43.2	73.9	30.7	100	0	
Vert.	7323.000	PK	47.9	36.6	8.6	41.4	51.7	73.9	22.2	100	0	
Vert.	9764.000	PK	43.3	38.7	9.5	38.9	52.6	73.9	21.3	100	0	
Vert.	12205.000	PK	45.8	39.5	10.8	39.3	56.8	73.9	17.1	100	0	
Vert.	4882.000	AV	36.2	31.3	6.9	41.1	33.3	53.9	20.6	100	0	
Vert.	7323.000	AV	35.8	36.6	8.6	41.4	39.6	53.9	14.3	100	0	
Vert.	9764.000	AV	33.5	38.7	9.5	38.9	42.8	53.9	11.1	100	0	
Vert.	12205.000	AV	34.3	39.5	10.8	39.3	45.3	53.9	8.6	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	3993.764	AV	52.6	29.7	6.2	41.8	-24.7	22.0	53.9	31.9	110	51	
Vert.	3993.764	AV	53.2	29.7	6.2	41.8	-24.7	22.6	53.9	31.3	138	332	

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

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

*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

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.1, 2 and No.3 Semi Anechoic Chamber
Date November 12, 2012 November 13, 2012 November 14, 2012
Temperature / Humidity 25 deg.C , 55 %RH 22 deg.C , 53 %RH 22 deg.C , 47 %RH
Engineer Takahiro Suzuki
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.	243.003	QP	45.5	16.9	10.1	31.7	40.8	46.0	5.2	226	157	
Hori.	266.674	QP	43.4	17.7	10.5	31.7	39.9	46.0	6.1	194	98	
Hori.	431.997	QP	47.9	16.7	7.8	31.7	40.7	46.0	5.3	100	82	
Hori.	2483.500	PK	48.7	27.5	14.3	41.4	49.1	73.9	24.8	121	214	
Hori.	3993.693	PK	55.9	29.7	6.2	41.8	50.0	73.9	23.9	115	52	
Hori.	4960.000	PK	48.3	31.6	6.9	41.0	45.8	73.9	28.1	100	0	
Hori.	7440.000	PK	47.5	36.7	8.8	41.5	51.5	73.9	22.4	100	0	
Hori.	9920.000	PK	44.6	39.0	9.7	38.9	54.4	73.9	19.5	100	0	
Hori.	12400.000	PK	46.7	39.5	10.8	39.3	57.7	73.9	16.2	100	0	
Hori.	2483.500	AV	34.8	27.5	14.3	41.4	35.2	53.9	18.7	121	214	
Hori.	4960.000	AV	35.8	31.6	6.9	41.0	33.3	53.9	20.6	100	0	
Hori.	7440.000	AV	36.1	36.7	8.8	41.5	40.1	53.9	13.8	100	0	
Hori.	9920.000	AV	34.5	39.0	9.7	38.9	44.3	53.9	9.6	100	0	
Hori.	12400.000	AV	34.0	39.5	10.8	39.3	45.0	53.9	8.9	100	0	
Vert.	296.997	QP	40.2	18.9	10.9	31.7	38.3	46.0	7.7	100	120	
Vert.	866.684	QP	39.8	21.7	9.9	31.1	40.3	46.0	5.7	100	47	
Vert.	900.015	QP	38.2	22.1	10.1	31.0	39.4	46.0	6.6	100	61	
Vert.	2483.500	PK	49.0	27.5	14.3	41.4	49.4	73.9	24.5	100	177	
Vert.	3993.693	PK	57.3	29.7	6.2	41.8	51.4	73.9	22.5	106	330	
Vert.	4960.000	PK	47.7	31.6	6.9	41.0	45.2	73.9	28.7	100	0	
Vert.	7440.000	PK	47.8	36.7	8.8	41.5	51.8	73.9	22.1	100	0	
Vert.	9920.000	PK	44.7	39.0	9.7	38.9	54.5	73.9	19.4	100	0	
Vert.	12400.000	PK	45.2	39.5	10.8	39.3	56.2	73.9	17.7	100	0	
Vert.	2483.500	AV	34.7	27.5	14.3	41.4	35.1	53.9	18.8	100	177	
Vert.	4960.000	AV	35.6	31.6	6.9	41.0	33.1	53.9	20.8	100	0	
Vert.	7440.000	AV	36.1	36.7	8.8	41.5	40.1	53.9	13.8	100	0	
Vert.	9920.000	AV	33.8	39.0	9.7	38.9	43.6	53.9	10.3	100	0	
Vert.	12400.000	AV	33.9	39.5	10.8	39.3	44.9	53.9	9.0	100	0	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	3993.693	AV	52.3	29.7	6.2	41.8	-24.7	21.7	53.9	32.2	115	52	
Vert.	3993.693	AV	53.1	29.7	6.2	41.8	-24.7	22.5	53.9	31.4	106	330	

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

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

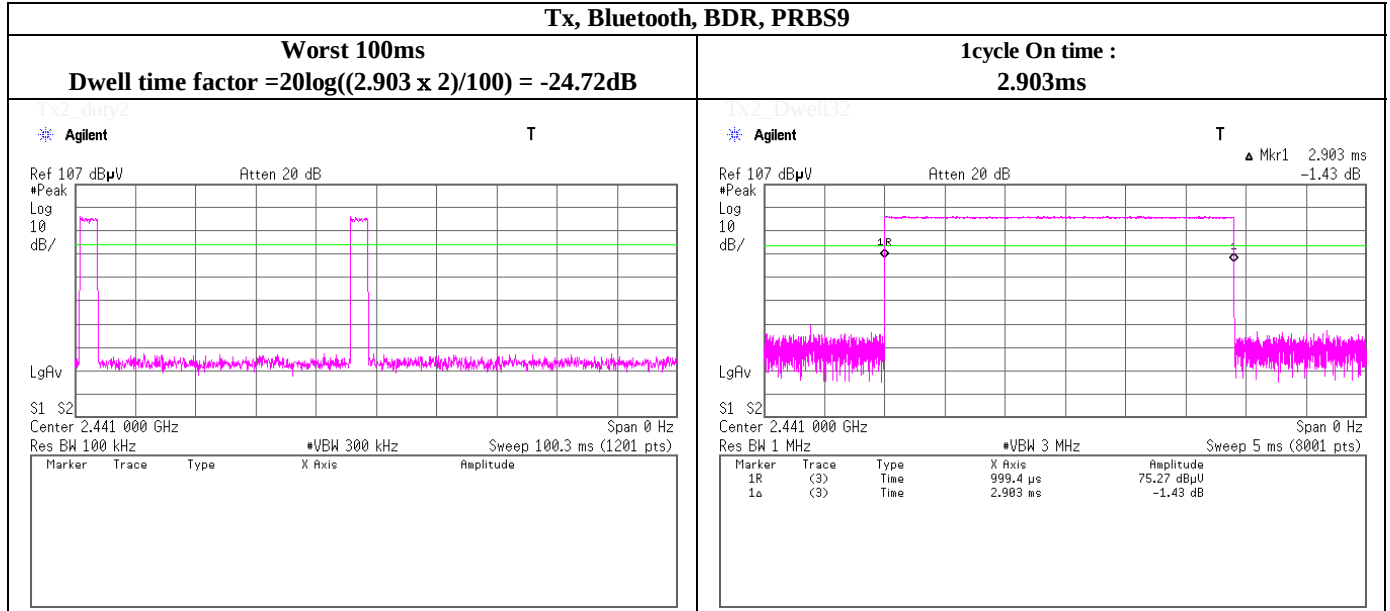
*The 10th harmonic was not seen so the result was its base noise level.

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

Dwell time factor Calculation chart

Dwell time factor Calculation

Tx, Bluetooth, BDR, PRBS9



VBW (Average) setting

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

UL Japan, Inc.

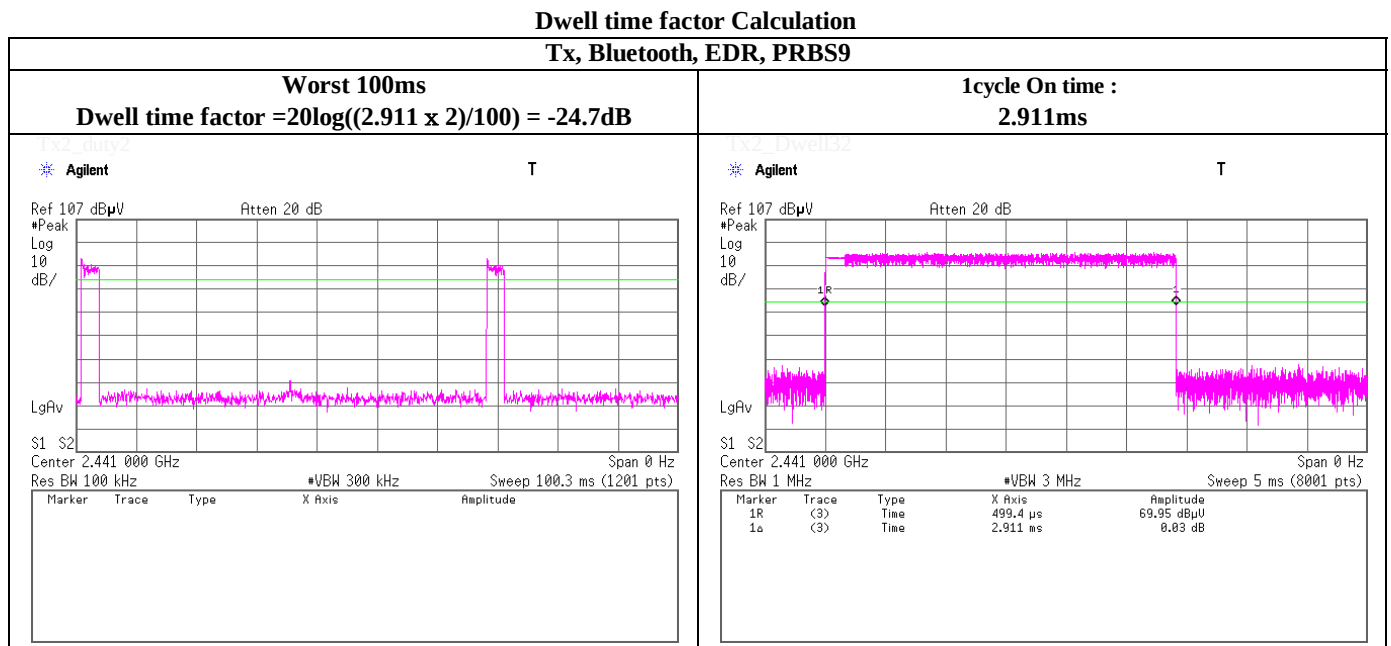
Shonan EMC Lab.

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Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Dwell time factor Calculation chart



VBW (Average) setting

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

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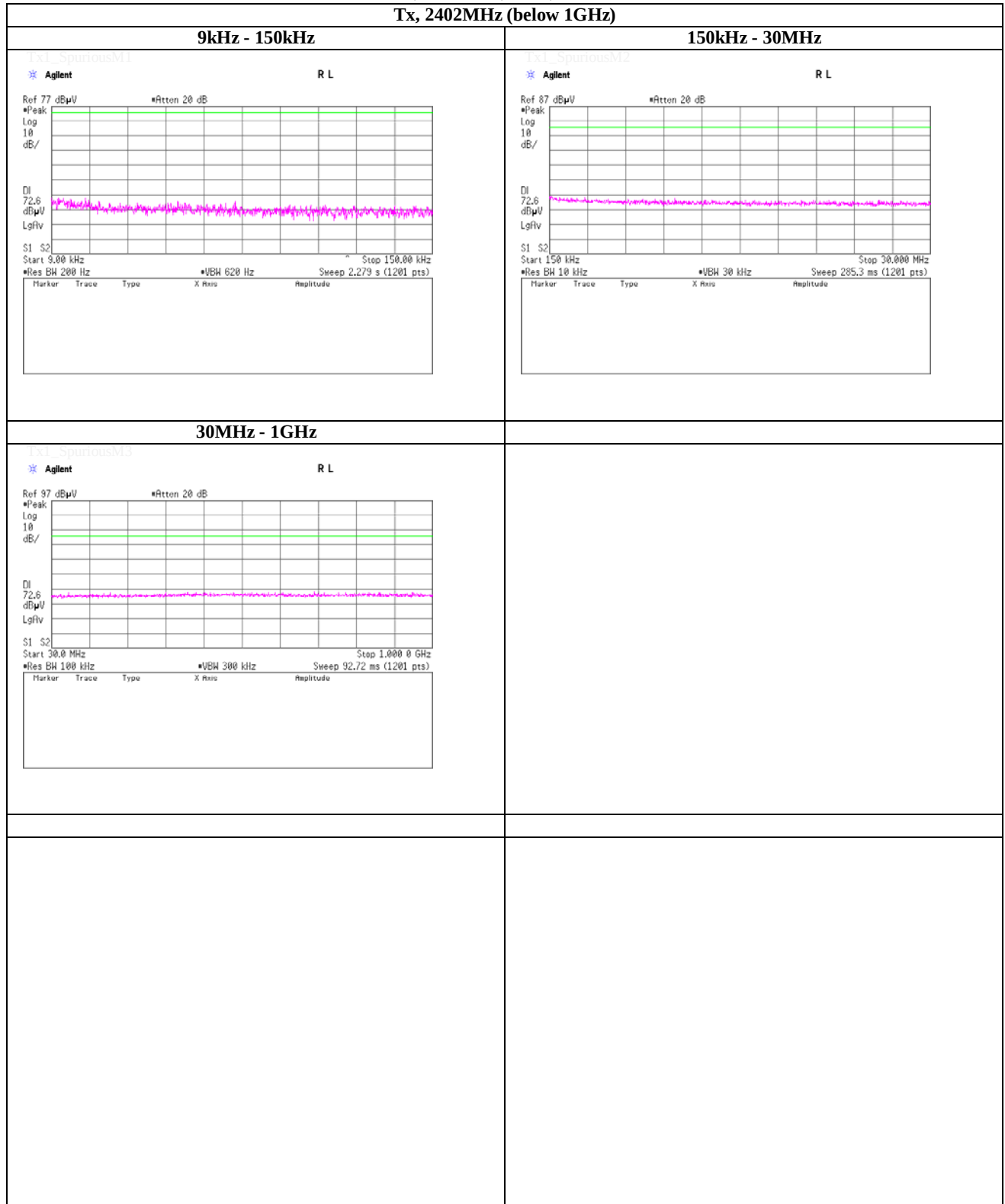
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

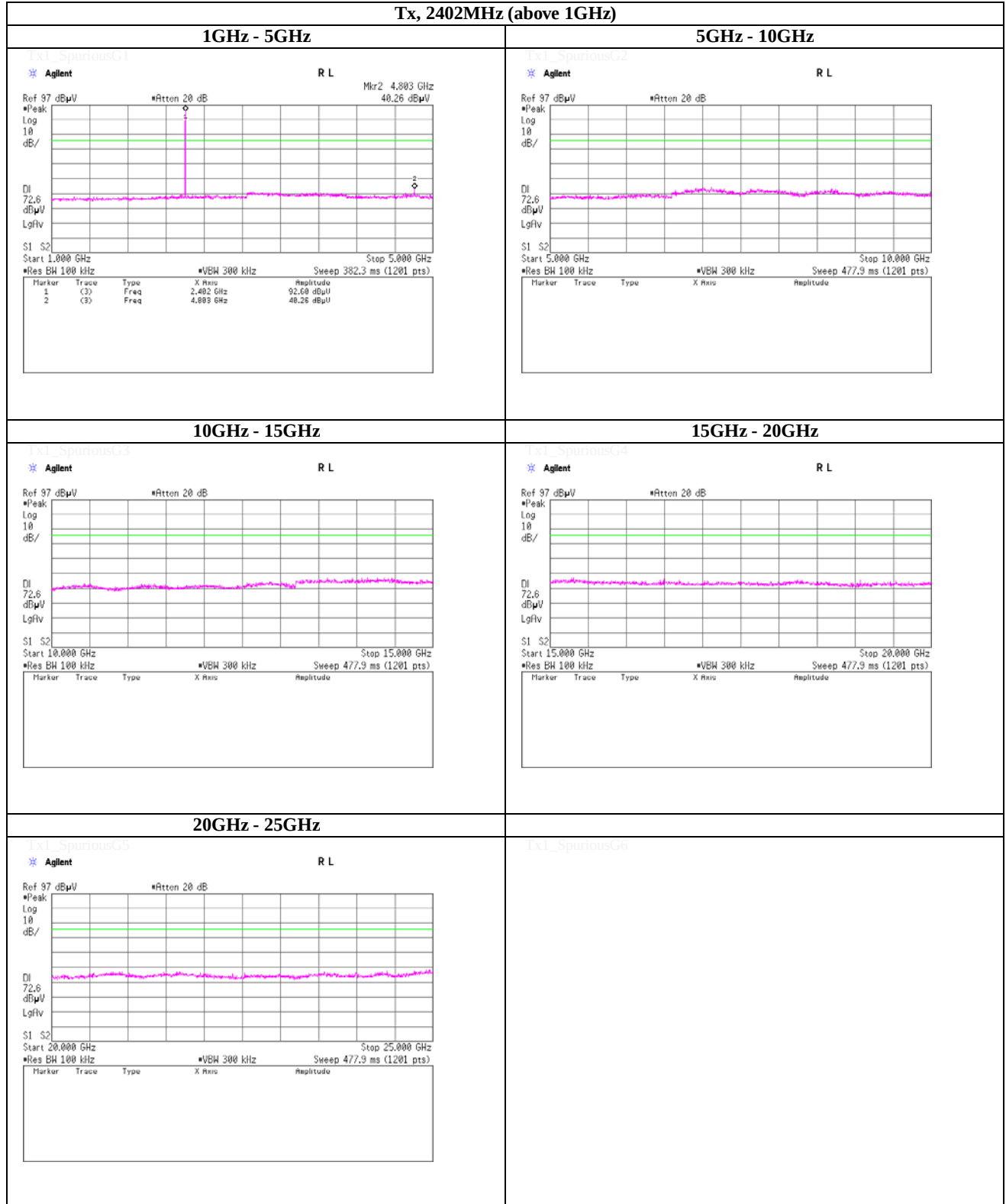
Tx, 2402MHz (below 1GHz)

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Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx, 2402MHz (above 1GHz)****UL Japan, Inc.****Shonan EMC Lab.**

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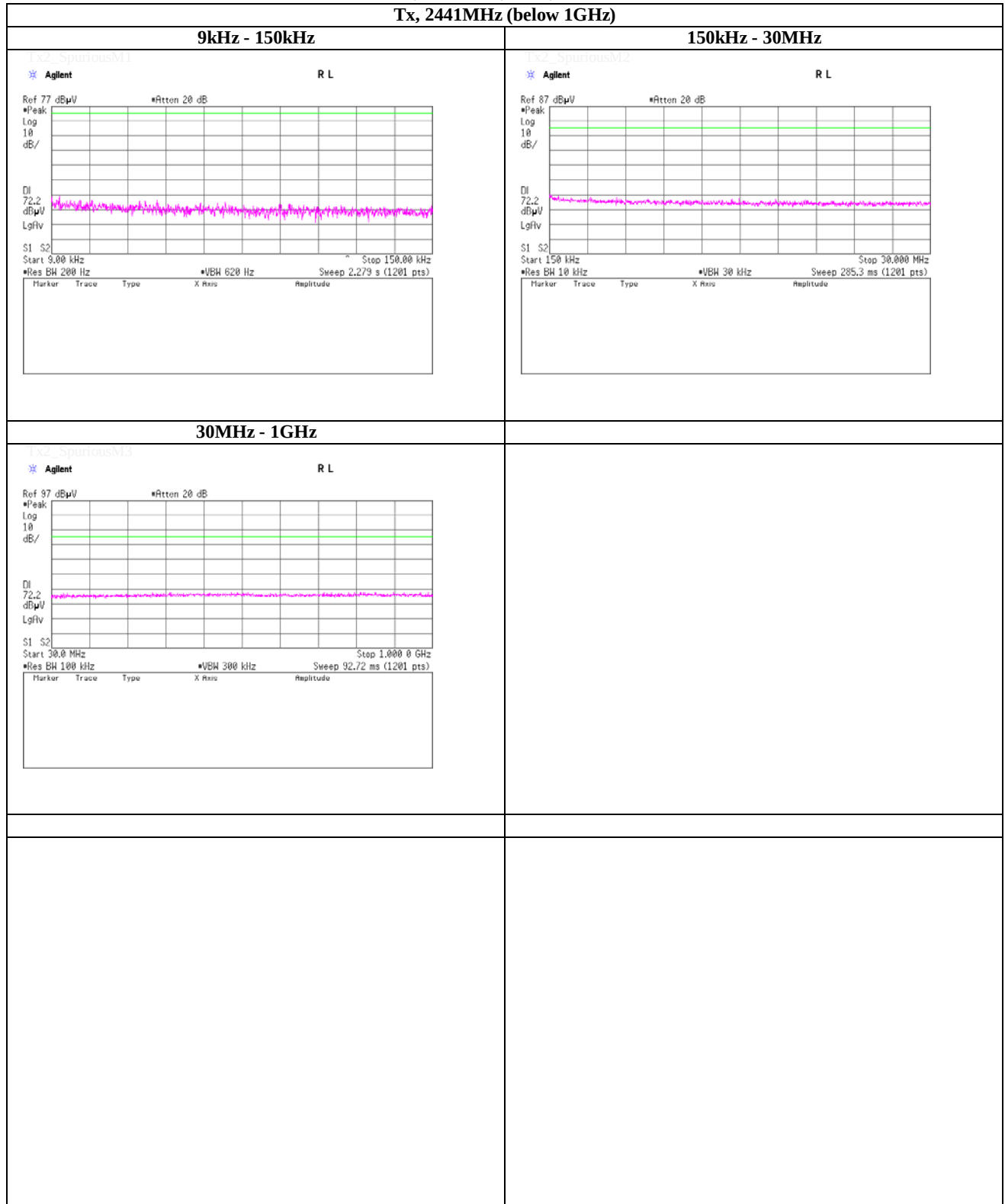
Telephone : +81 463 50 6400

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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

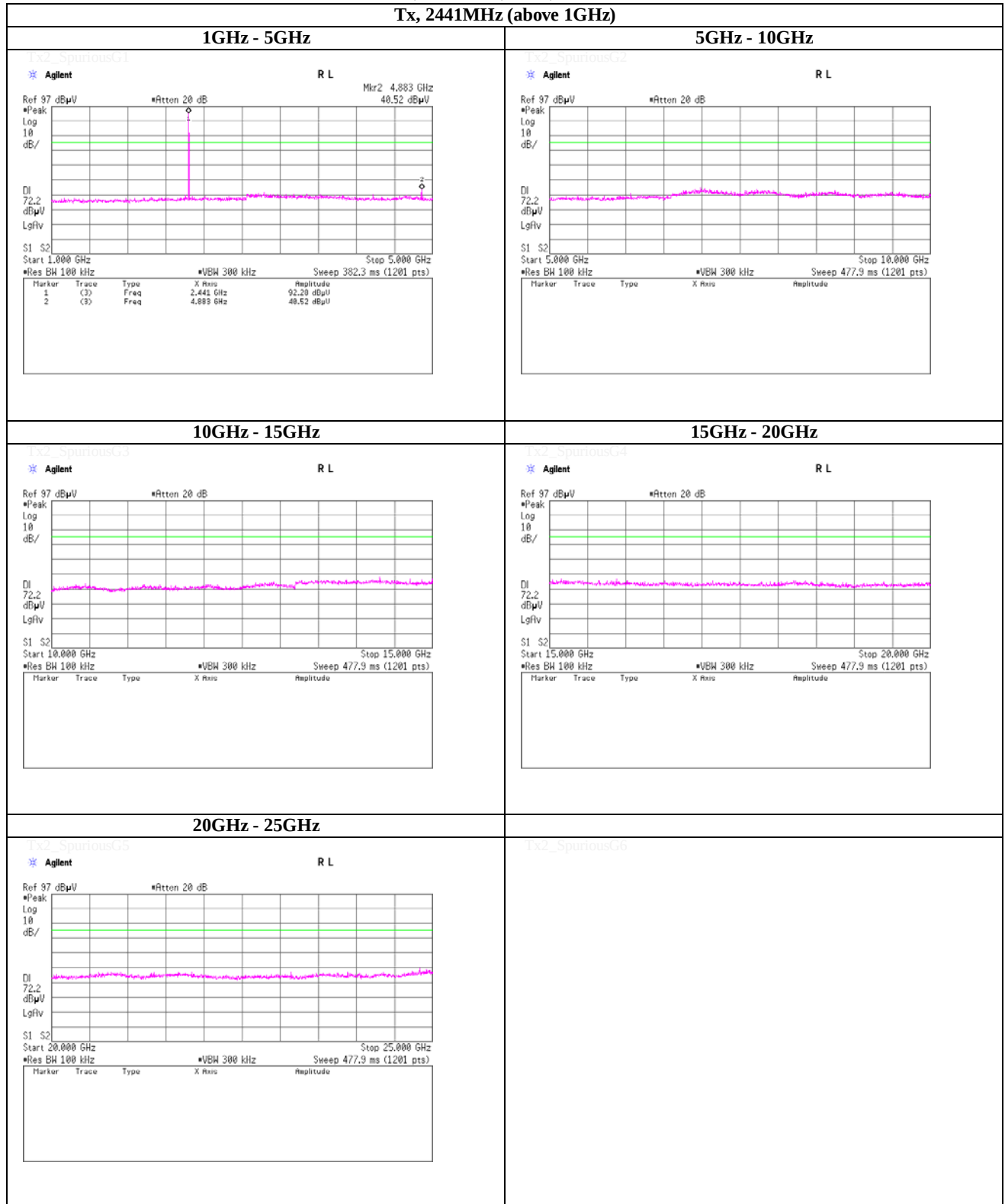
Tx, 2441MHz (below 1GHz)

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

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

Telephone : +81 463 50 6400

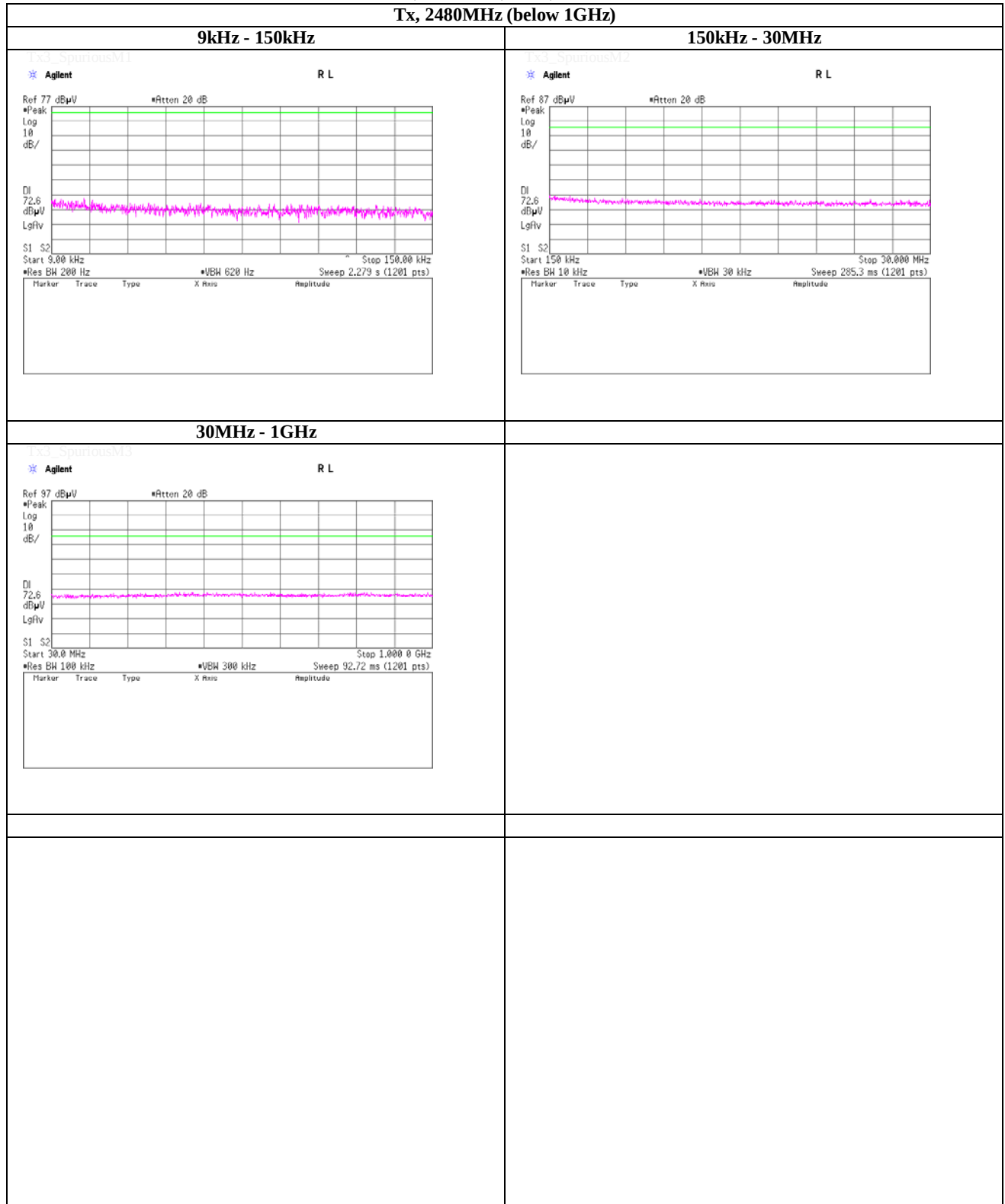
Facsimile : +81 463 50 6401

Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx, 2441MHz (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

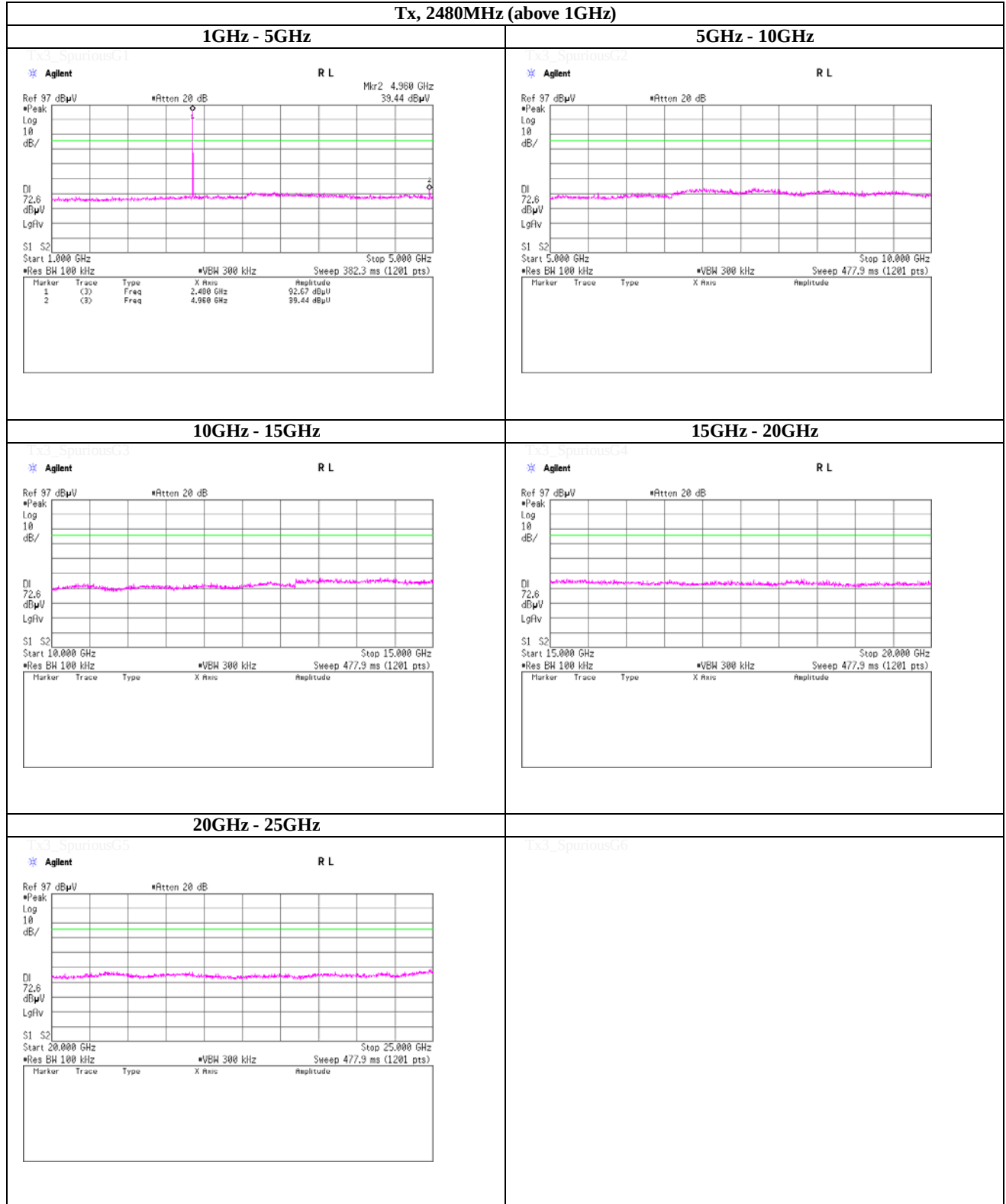
Tx, 2480MHz (below 1GHz)

**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.**

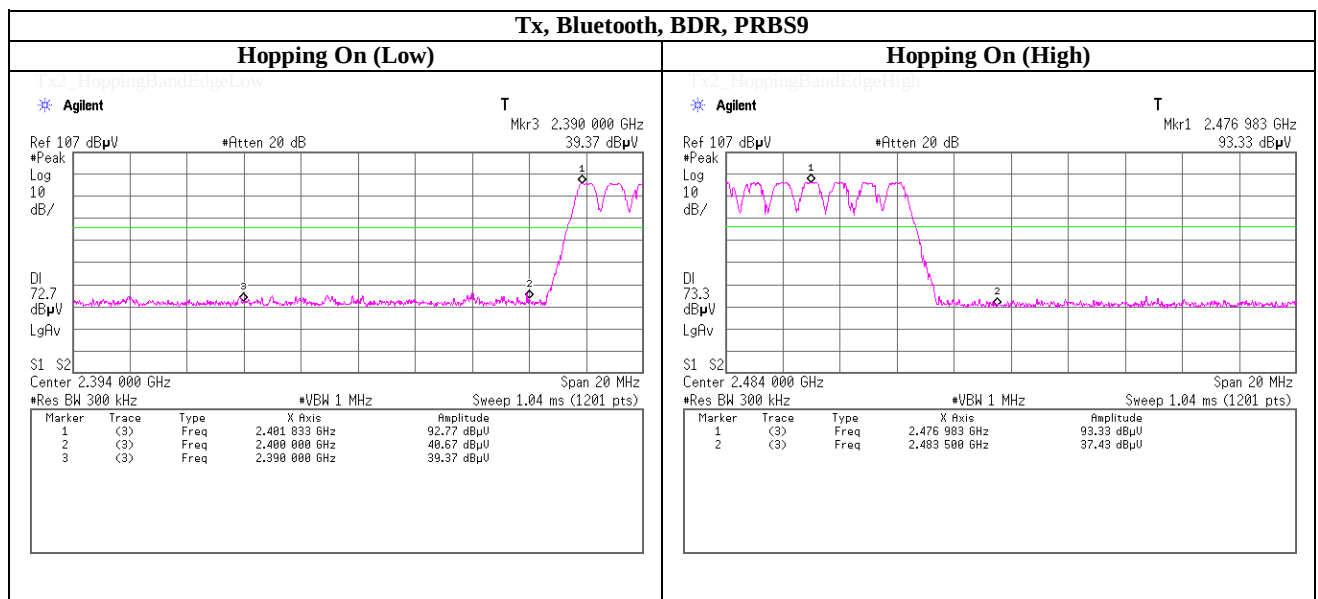
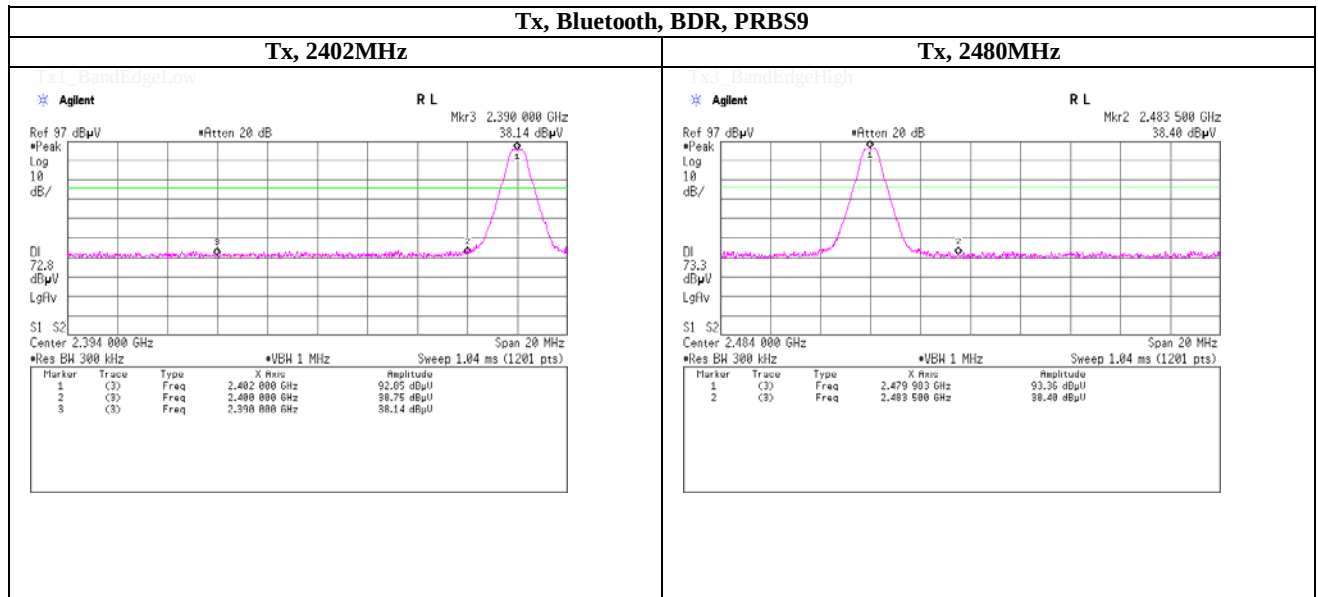
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Telephone : +81 463 50 6400

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Spurious emission (Conducted)

Band Edge compliance



UL Japan, Inc.

Shonan EMC Lab.

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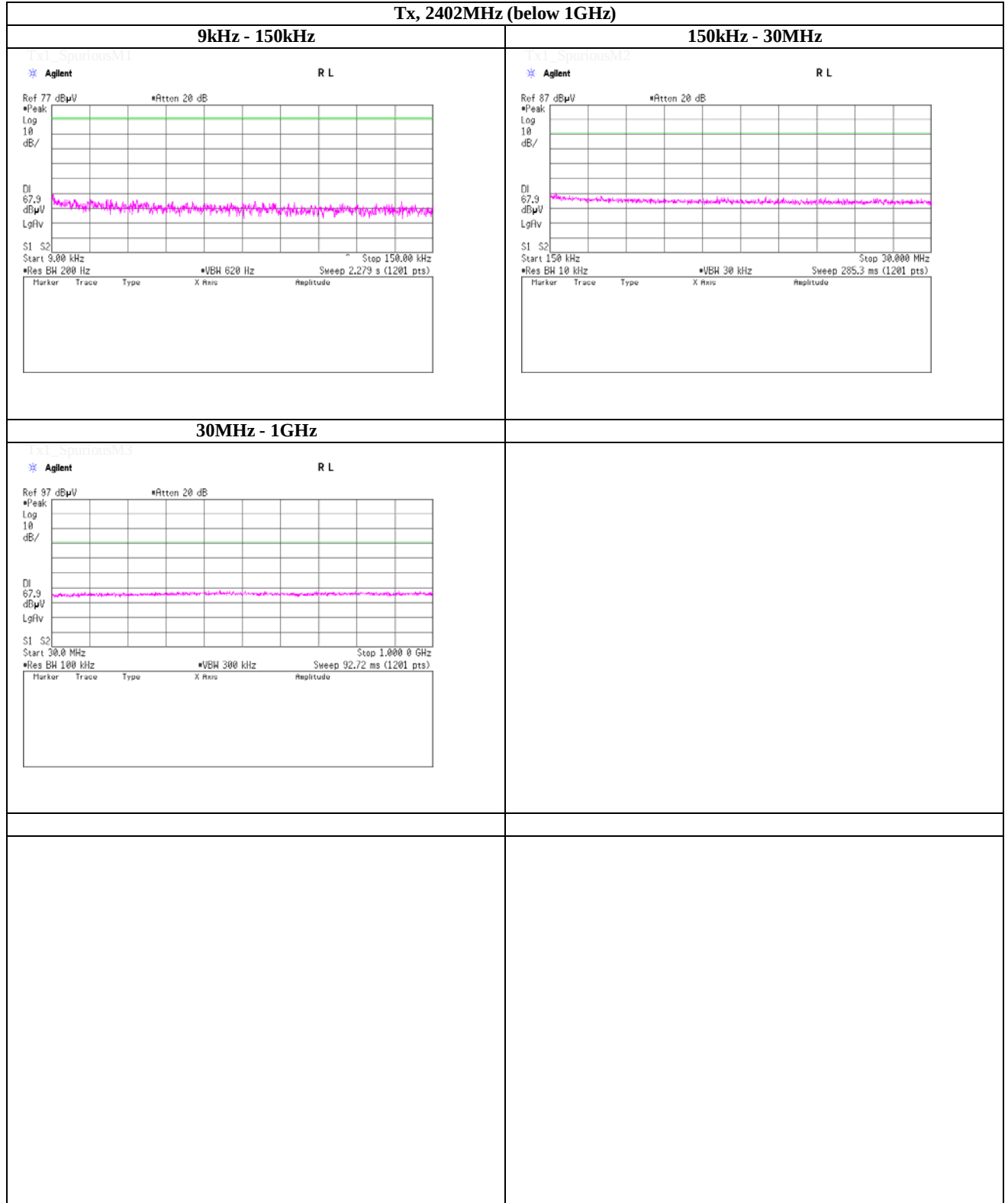
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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (below 1GHz)



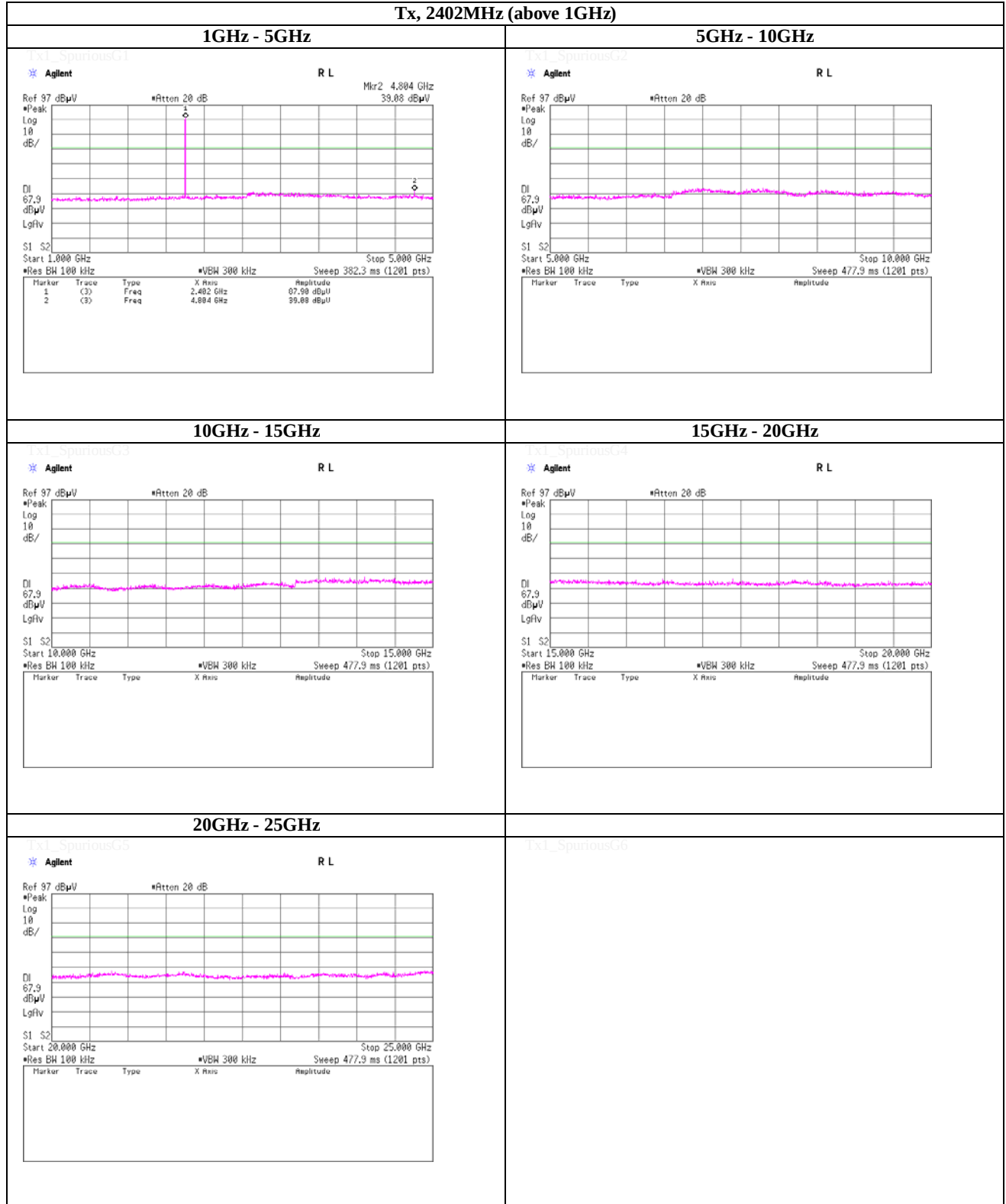
UL Japan, Inc.

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, 2402MHz (above 1GHz)****UL Japan, Inc.****Shonan EMC Lab.**

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

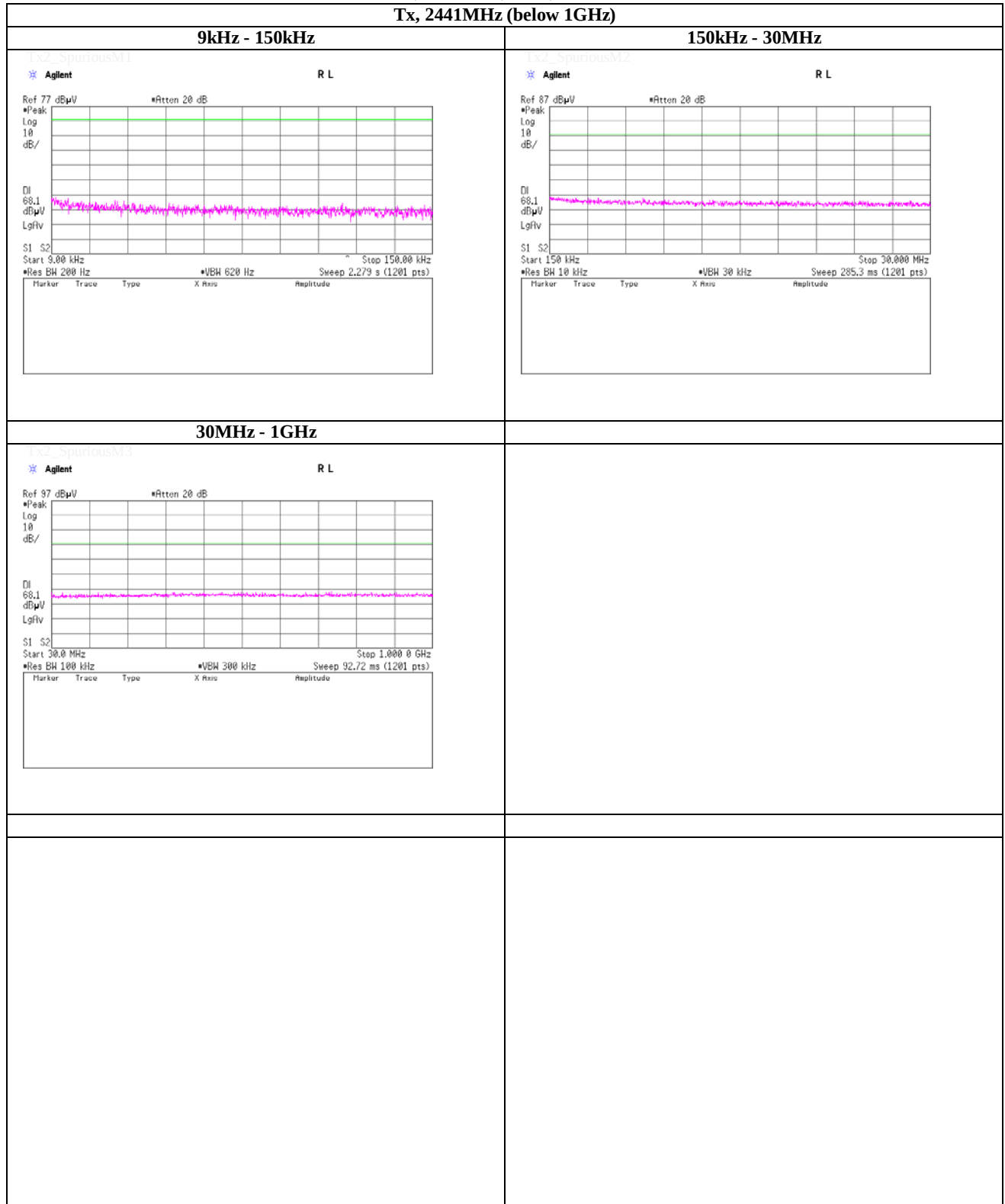
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

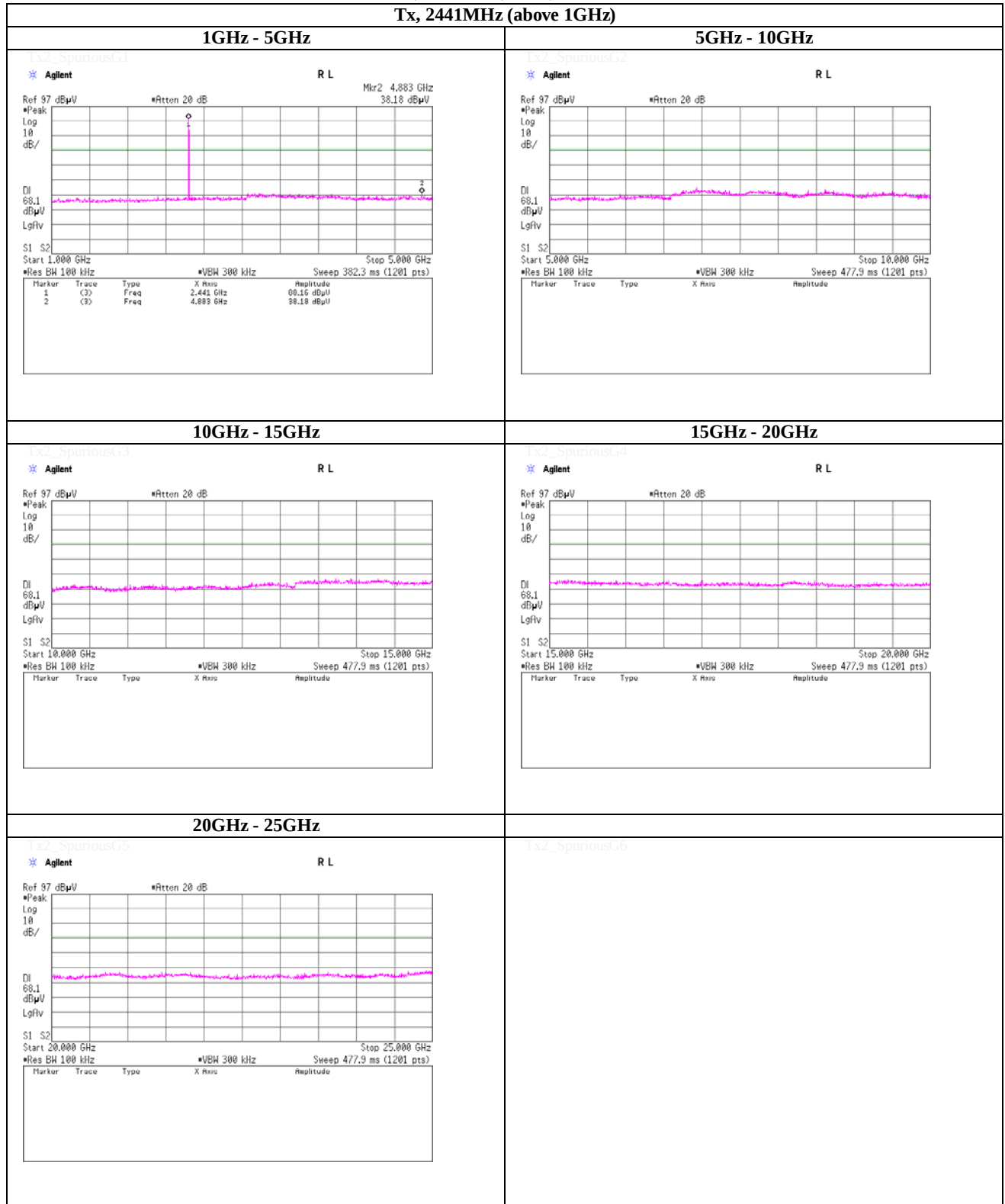
Tx, 2441MHz (below 1GHz)

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Spurious emission (Conducted)**Tx, Bluetooth, EDR, PRBS9****Tx, 2441MHz (above 1GHz)****UL Japan, Inc.****Shonan EMC Lab.**

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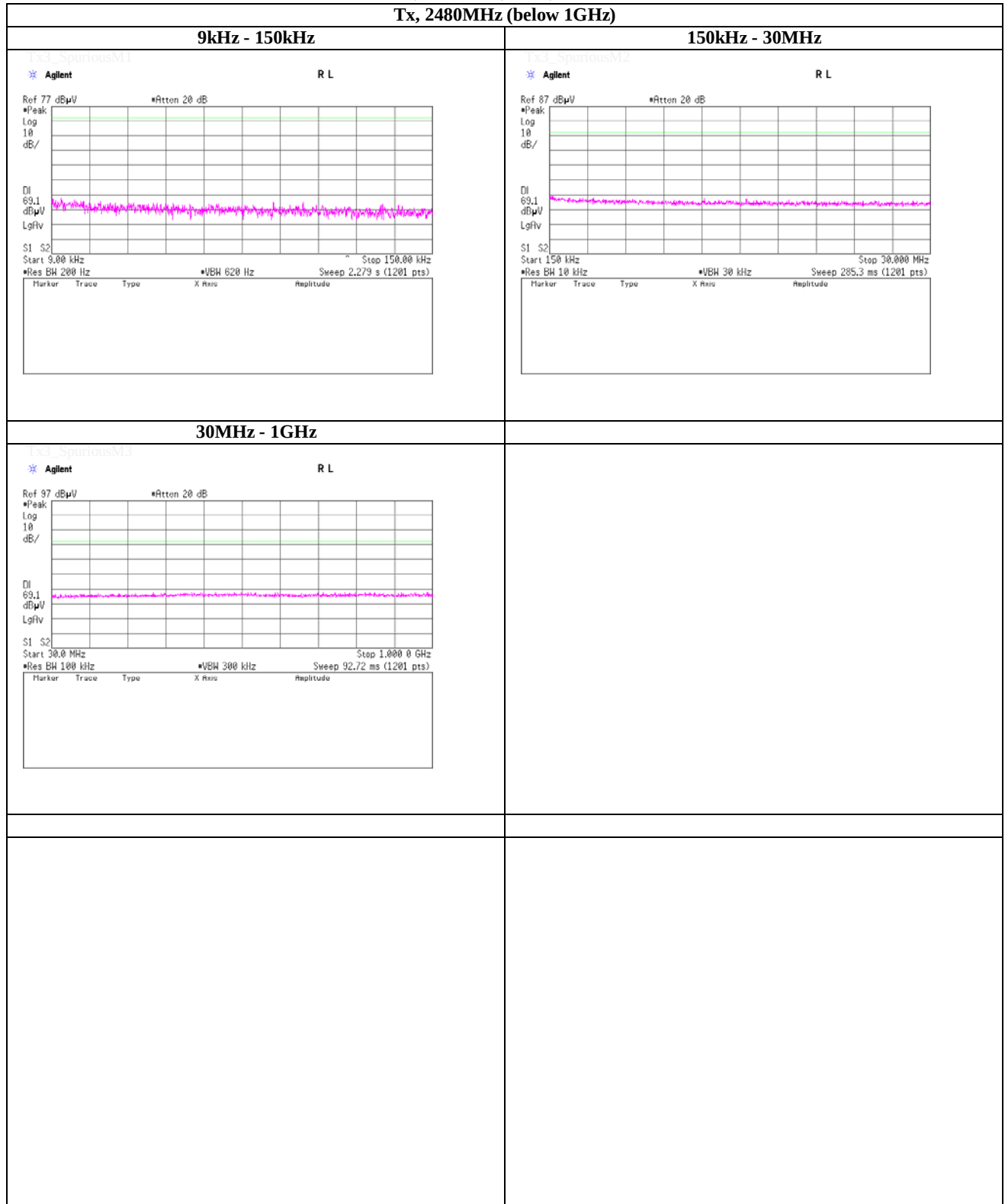
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

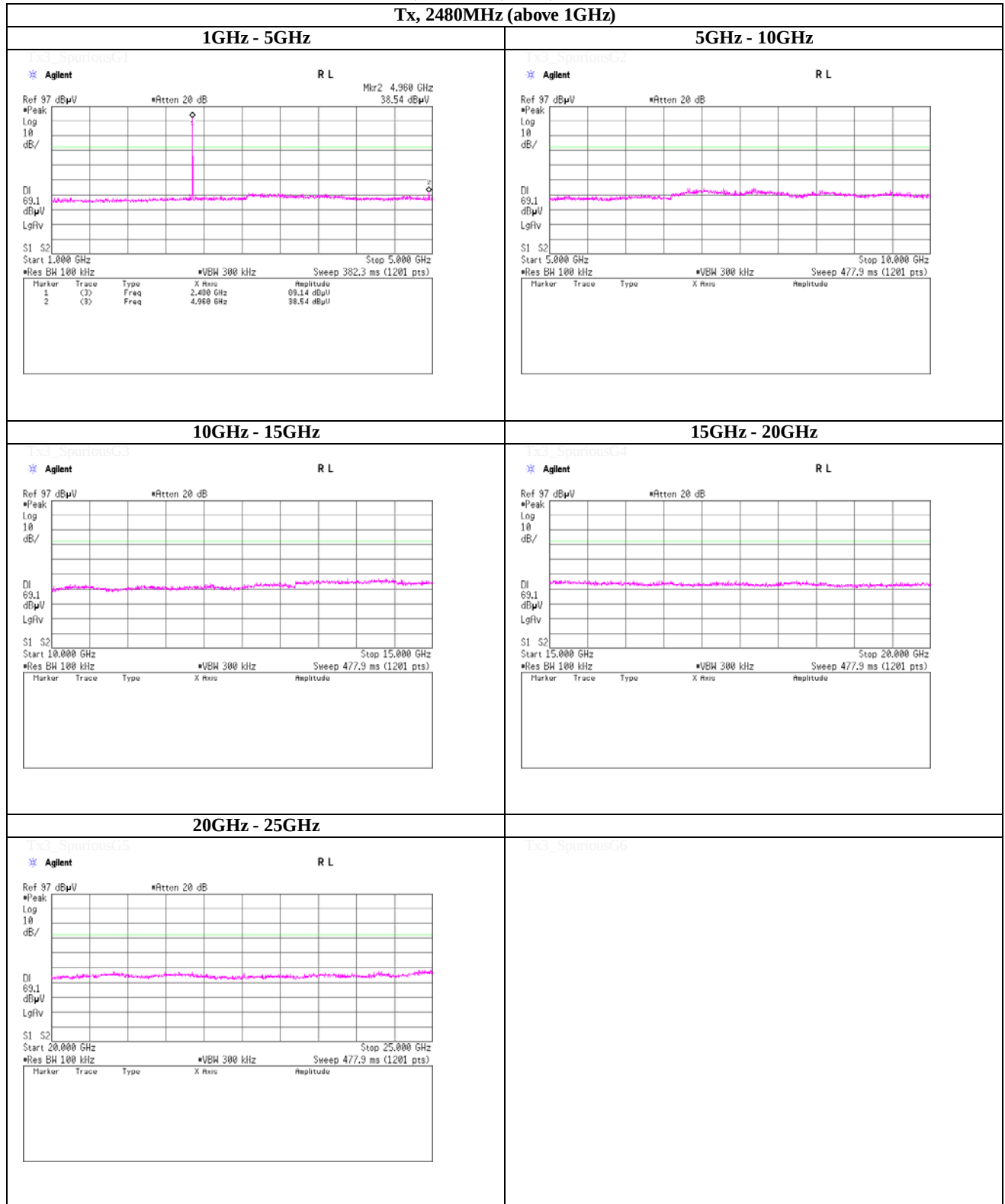
Tx, 2480MHz (below 1GHz)

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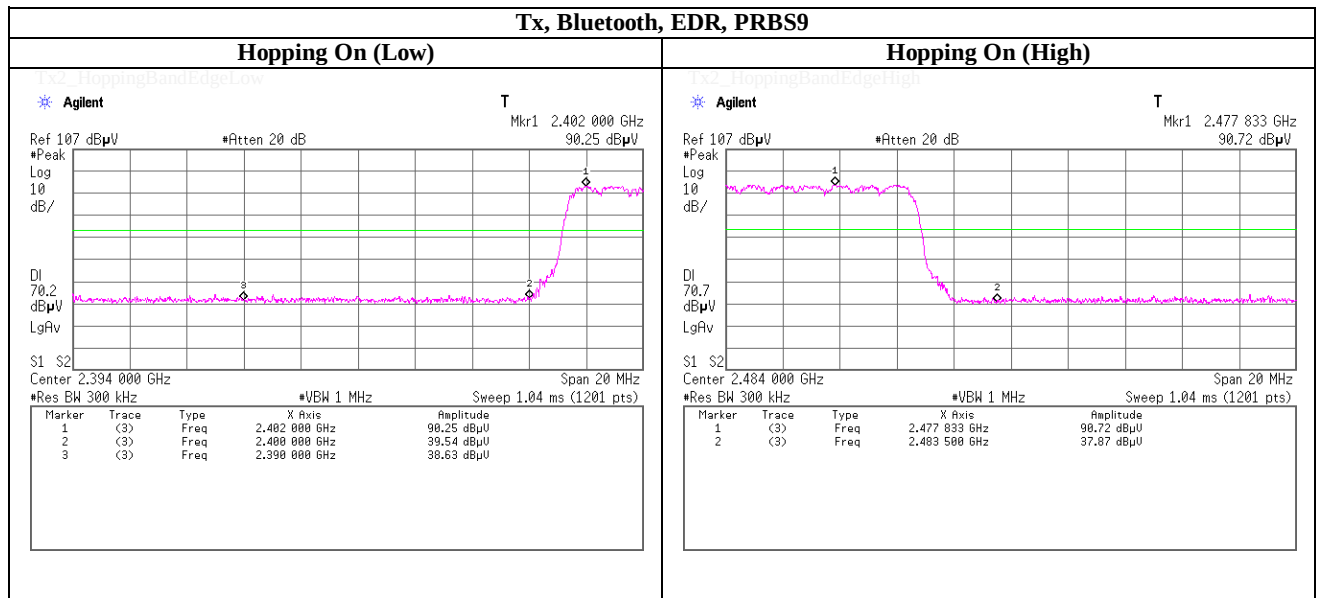
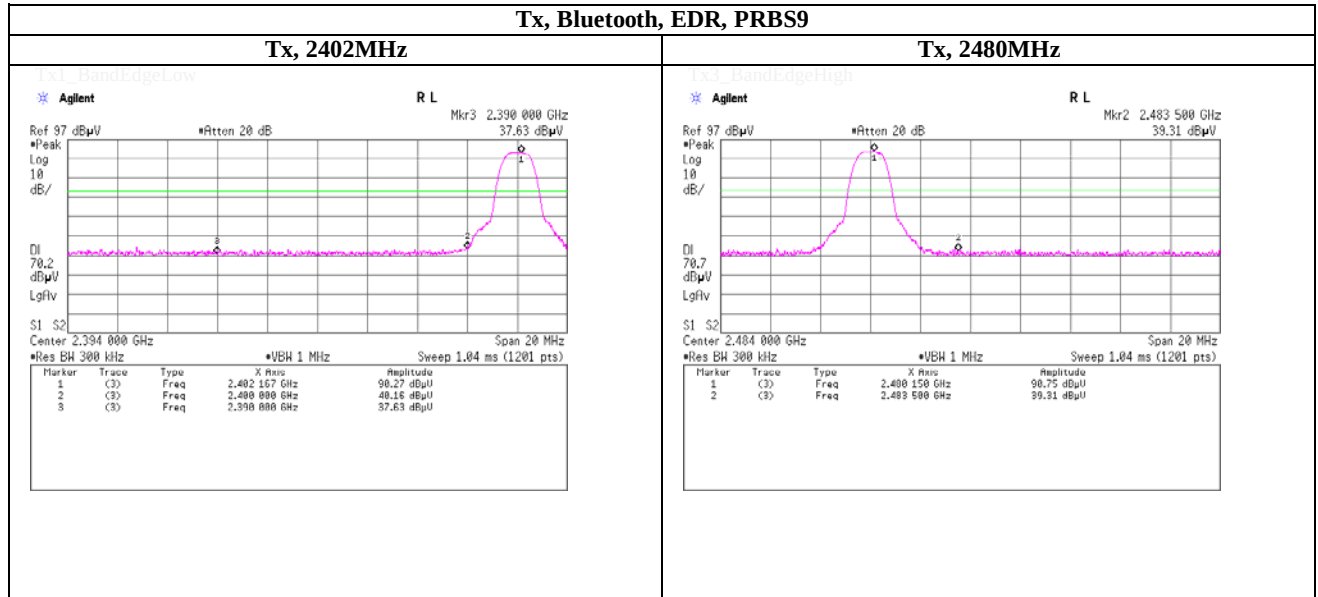
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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



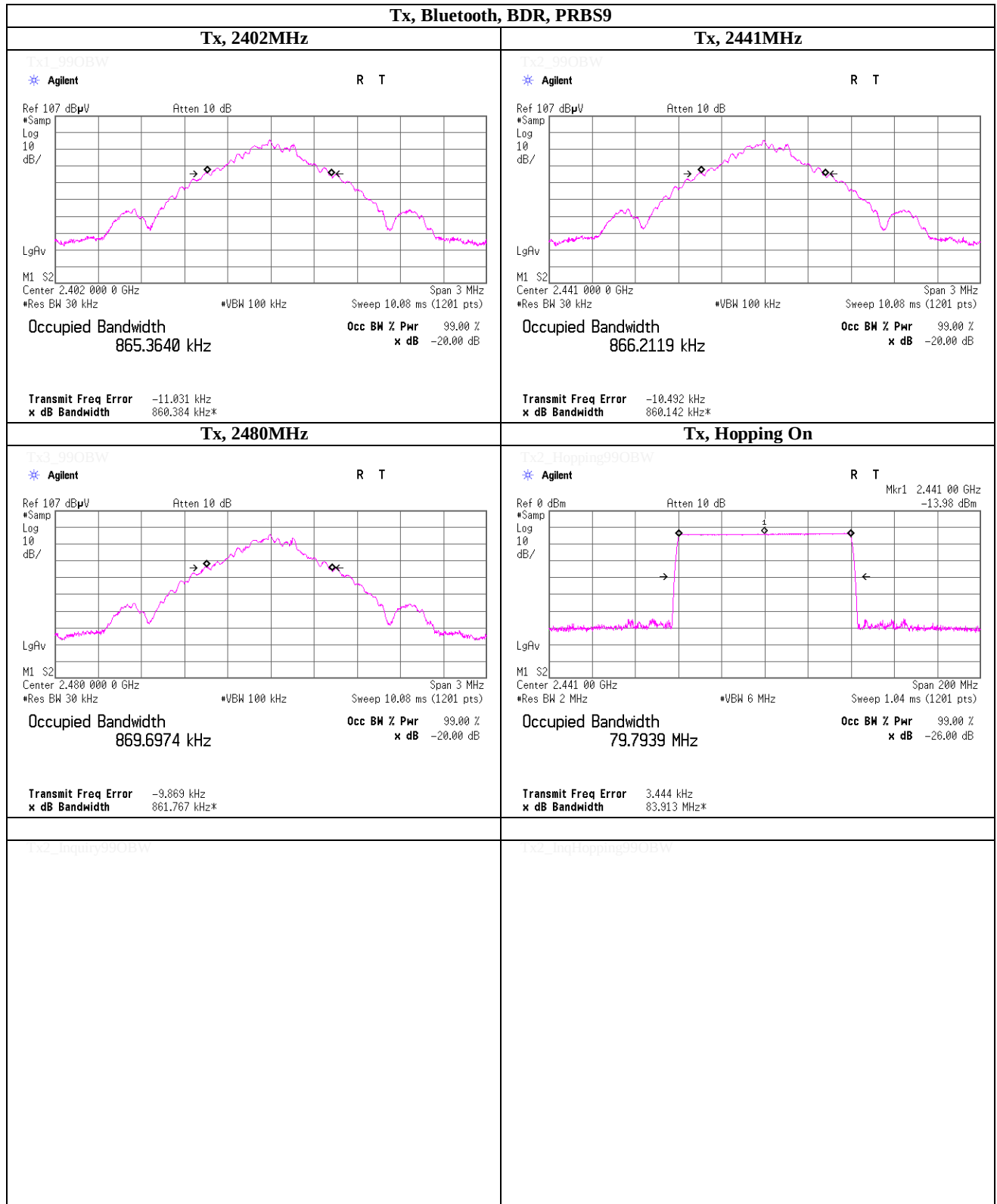
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99% Occupied Bandwidth**UL Japan, Inc.****Shonan EMC Lab.**

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99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
Tx, 2402MHz	Tx, 2441MHz
Tx1_99OBW Agilent R T Ref 107 dBμV Atten 10 dB Log 10 dB/ LgRv M1 S2 Center 2.402 000 0 GHz Span 3 MHz Res BW 30 kHz VBW 100 kHz Sweep 10.00 ms (1201 pts) Occupied Bandwidth 1.1765 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -8.218 kHz x dB Bandwidth 1.271 MHz*	Tx2_99OBW Agilent R T Ref 107 dBμV Atten 10 dB Log 10 dB/ LgRv M1 S2 Center 2.441 000 0 GHz Span 3 MHz Res BW 30 kHz VBW 100 kHz Sweep 10.00 ms (1201 pts) Occupied Bandwidth 1.1765 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -8.046 kHz x dB Bandwidth 1.267 MHz*
Tx, 2480MHz	Tx, Hopping On
Tx3_99OBW Agilent R T Ref 107 dBμV Atten 10 dB Log 10 dB/ LgRv M1 S2 Start 2.478 500 0 GHz Stop 2.481 500 0 GHz Res BW 30 kHz VBW 100 kHz Sweep 10.00 ms (1201 pts) Occupied Bandwidth 1.1759 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -8.123 kHz x dB Bandwidth 1.271 MHz*	Tx2_Hopping99OBW
Tx2_Inquiry99OBW	Tx2_InqHopping99OBW

UL Japan, Inc.

Shonan EMC Lab.

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Test Report No : 33AE0185-SH-02-A

APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	AT	2012/03/26 * 12
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
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2012/04/06 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2012/03/12 * 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
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,IMF)	-	RE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2012/09/11 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2012/03/12 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2012/04/10 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2012/05/22 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2012/08/20 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2012/02/06 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2012/10/04 * 12
SJM-08	Measure	PROMART	SEN1935	-	RE	-
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2012/03/30 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2012/03/12 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2012/03/12 * 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
STR-03	Test Receiver	Rohde & Schwarz	ESI40	100054/040	RE	2012/06/14 * 12
SJM-11	Measure	PROMART	SEN1935	-	RE	-

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 disturbance voltage

End of Report