

## **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                              November 5, 2012  
 Temperature / Humidity      25deg.C                      , 43%RH  
 Engineer                        Tatsuya Arai  
 Mode                              Tx, Bluetooth, BDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.947	1.000	>= 0.631
DH5	2441.0	0.946	1.000	>= 0.631
DH5	2480.0	0.950	1.000	>= 0.633

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

No limit applies to 20dB Bandwidth.

**UL Japan, Inc.**

**Shonan EMC Lab.**

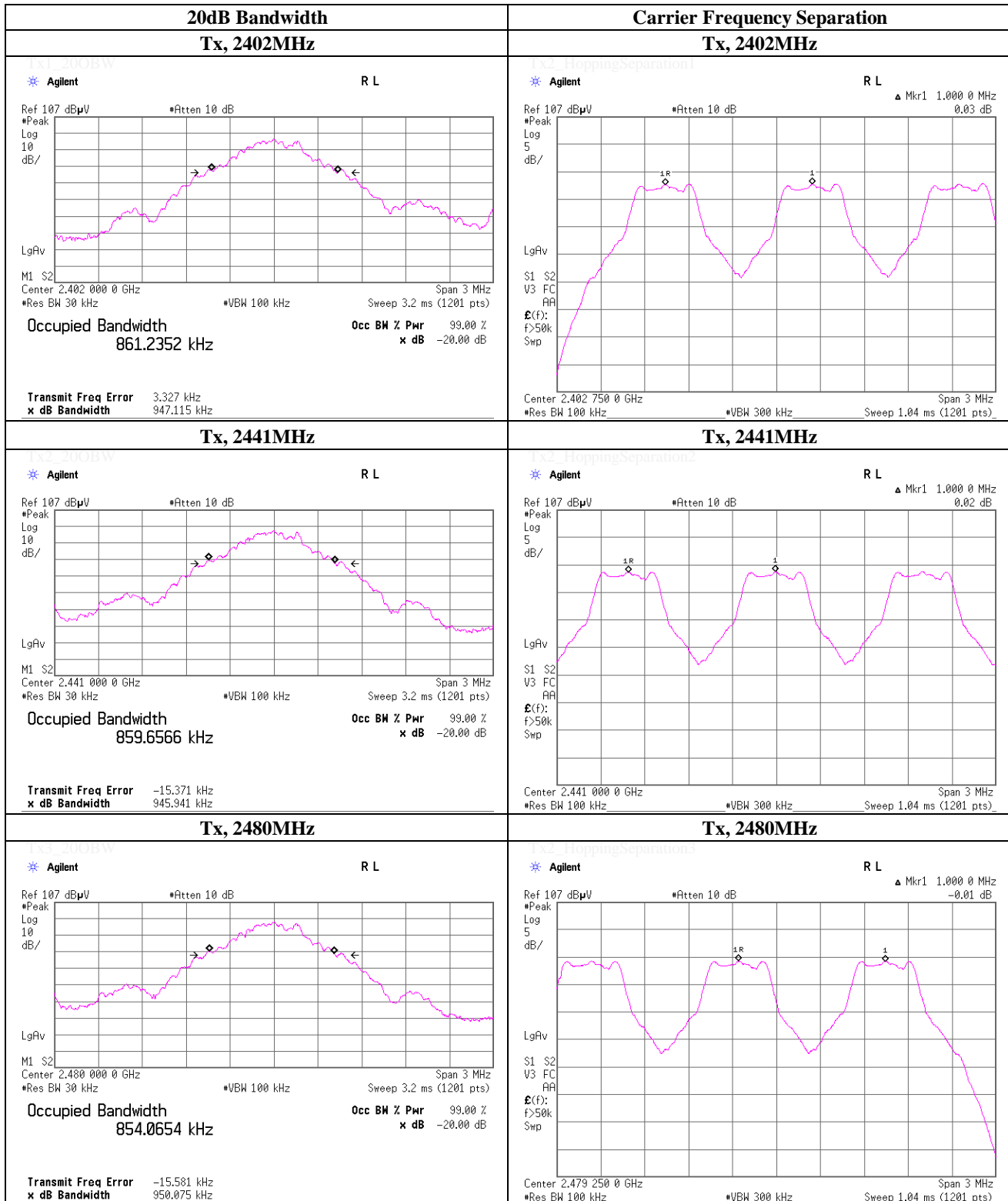
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## 20dB Bandwidth and Carrier Frequency Separation

### Tx, Bluetooth, BDR, PRBS9



**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

## 20dB Bandwidth and Carrier Frequency Separation

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.5 Shielded Room  
 Date                              November 5, 2012  
 Temperature / Humidity      25deg.C                      , 43%RH  
 Engineer                        Tatsuya Arai  
 Mode                              Tx, Bluetooth, EDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.269	1.000	>= 0.846
3-DH5	2441.0	1.260	1.000	>= 0.840
3-DH5	2480.0	1.261	1.000	>= 0.841

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

No limit applies to 20dB Bandwidth.

**UL Japan, Inc.**

**Shonan EMC Lab.**

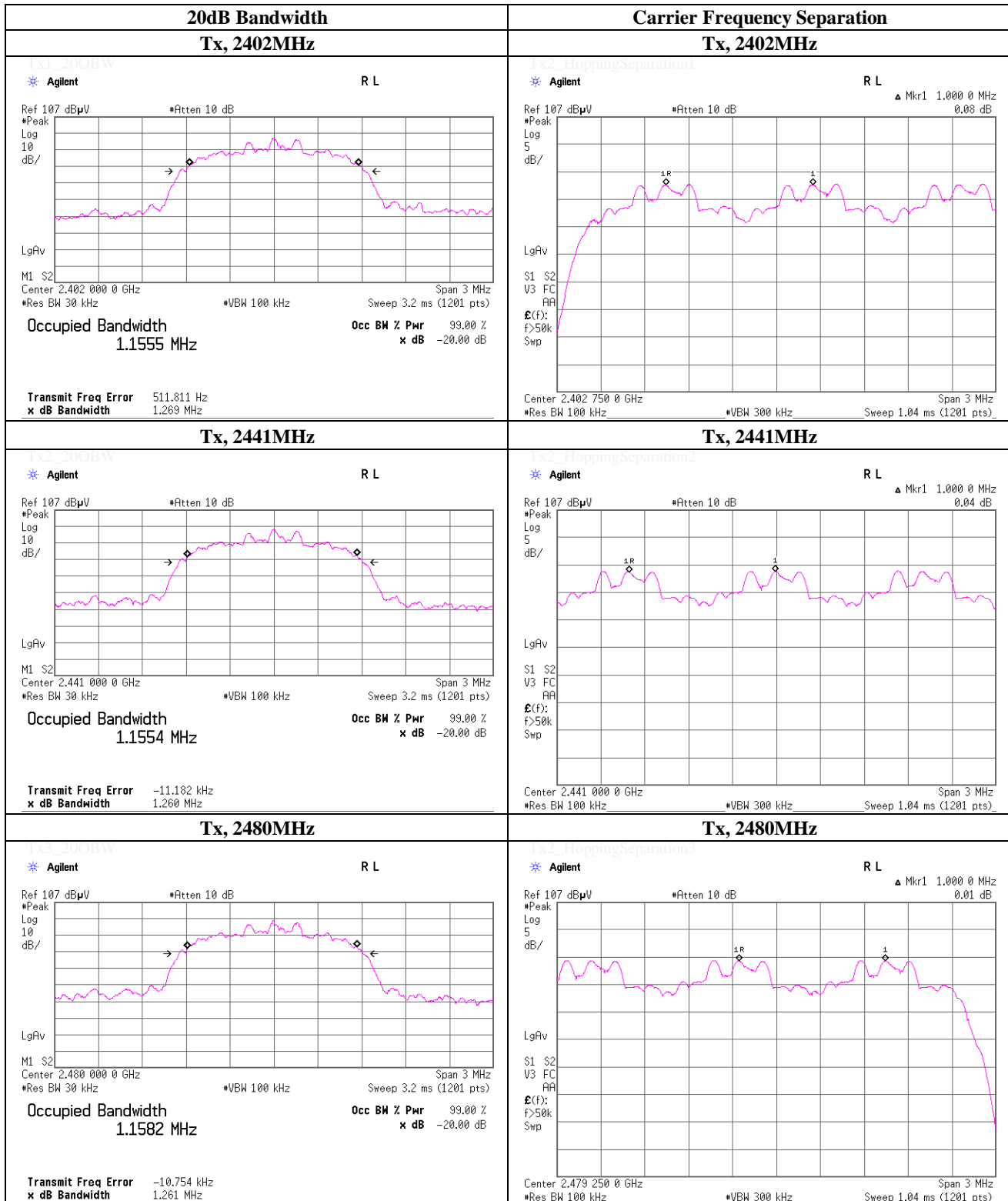
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## 20dB Bandwidth and Carrier Frequency Separation

### Tx, Bluetooth, EDR, PRBS9



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

Telephone : +81 463 50 6400

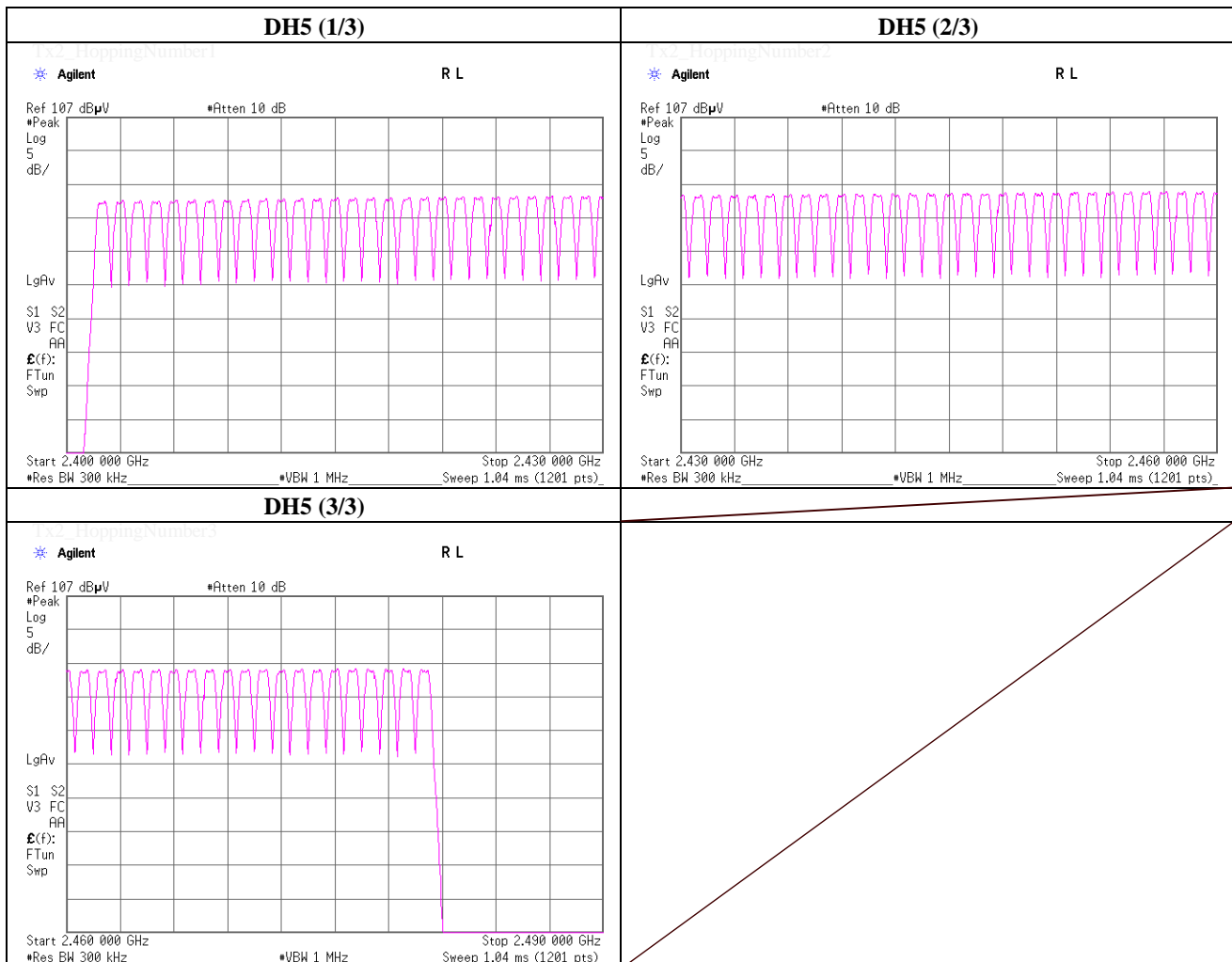
Facsimile : +81 463 50 6401

### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	November 5, 2012	
Temperature / Humidity	25deg.C , 43%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.



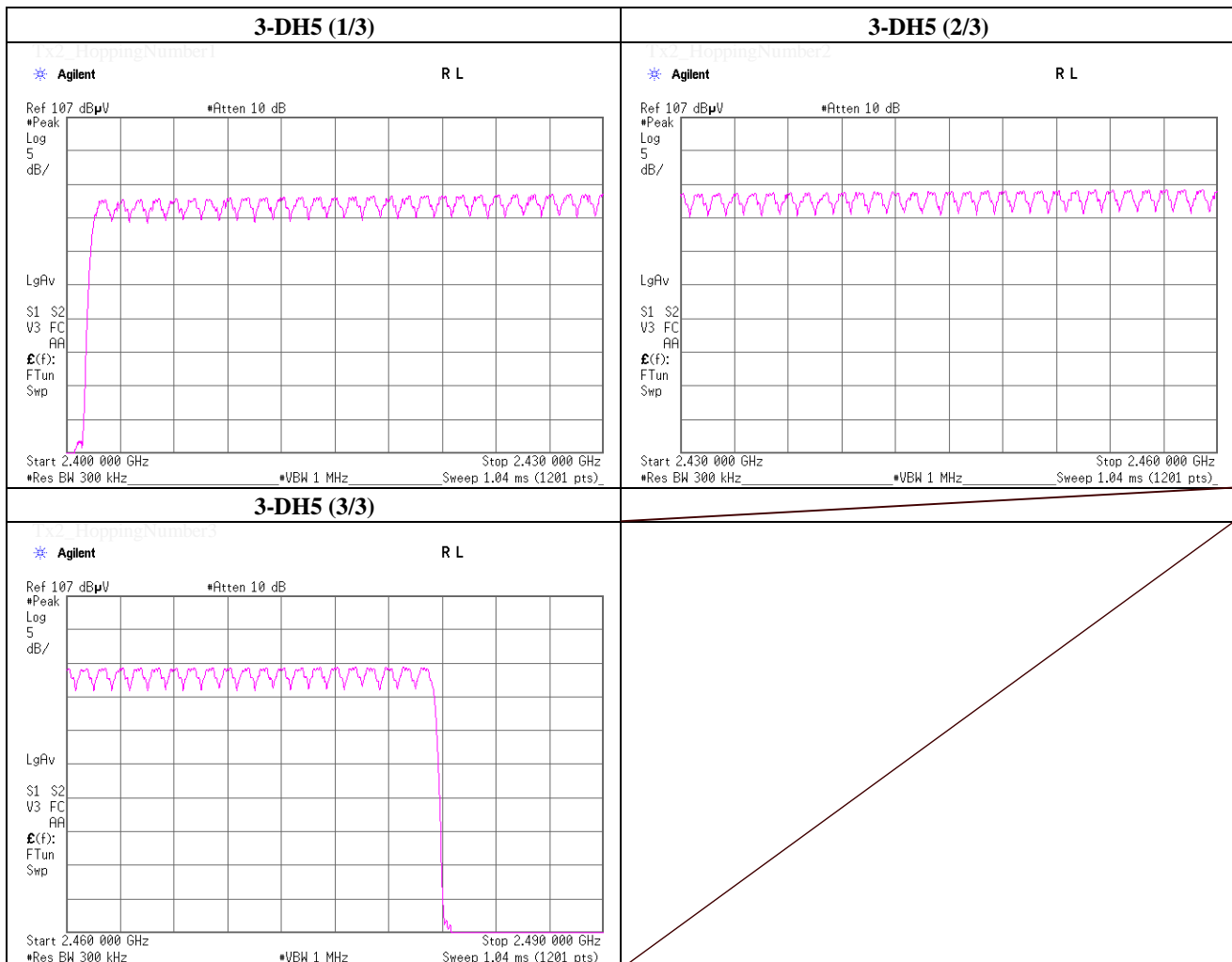
**UL Japan, Inc.**  
**Shonan EMC Lab.**  
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN  
 Telephone : +81 463 50 6400  
 Facsimile : +81 463 50 6401

### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	November 5, 2012	
Temperature / Humidity	25deg.C , 43%RH	
Engineer	Tatsuya Arai	
Mode	Tx, Bluetooth, EDR, PRBS9	

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

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



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

## Dwell Time

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.5 Shielded Room  
 Date                         November 5, 2012  
 Temperature / Humidity   25deg.C       , 43%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	0.401	130	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.658	273	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.904	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  $N=79$ .

**UL Japan, Inc.**

**Shonan EMC Lab.**

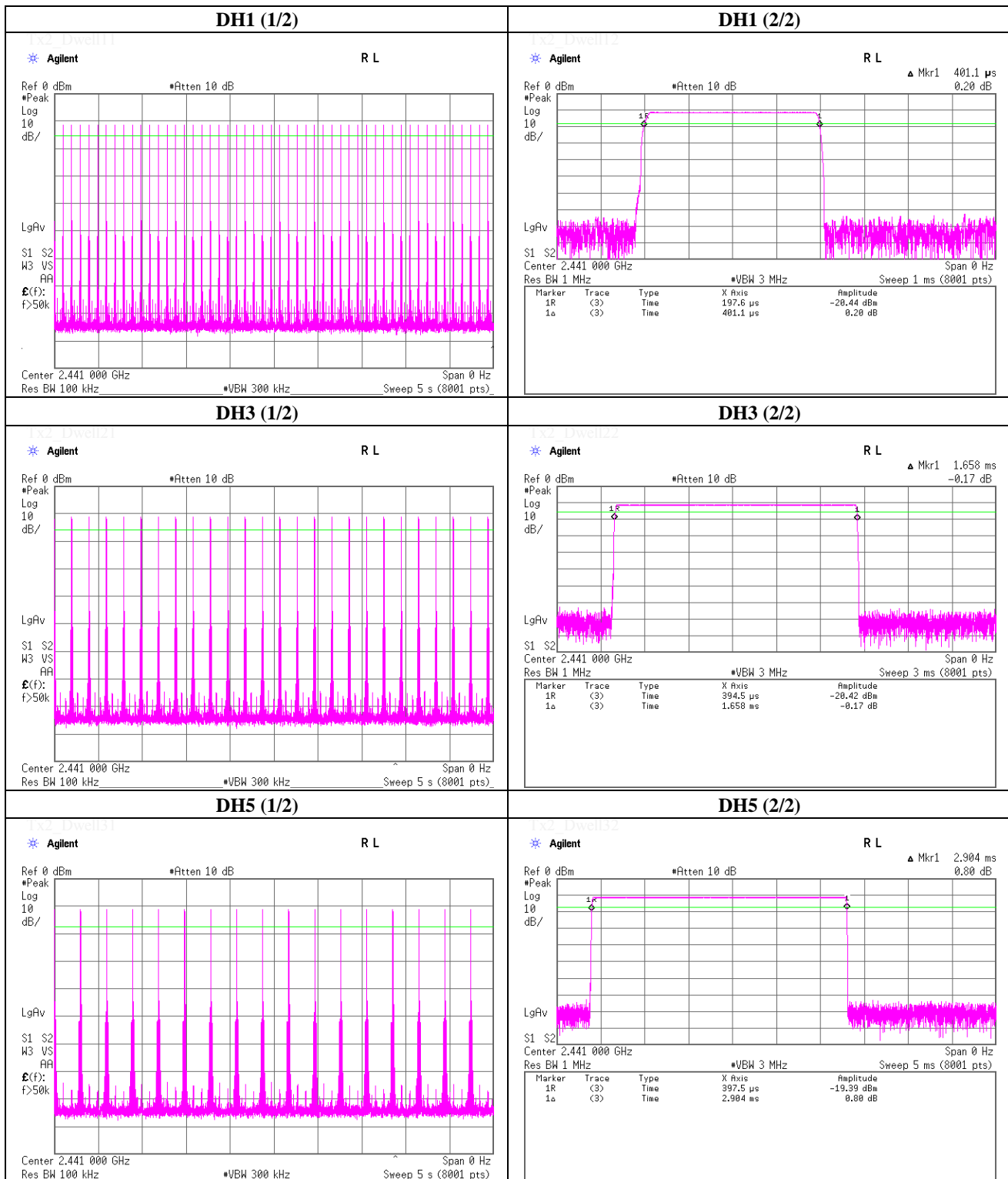
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Dwell time

### Tx, Bluetooth, BDR, PRBS9



**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

Test place           UL Japan, Inc. Shonan EMC Lab.           No.5 Shielded Room  
 Date                 November 5, 2012  
 Temperature / Humidity   25deg.C     , 43%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	0.414	134	400
3-DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.663	274	400
3-DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.913	315	400

Sample Calculation

Result = Number of transmission x Length of transmission time

\* This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in  $N \times 0.4s$ , where  $N$  is the number of channels being used in the hopping sequence ( $20 \leq N \leq 79$ ), is always less than 0.4s regardless of packet size (3-DH1, 3-DH3 or 3-DH5). This is confirmed in the test report for  $N=79$ .

**UL Japan, Inc.**

**Shonan EMC Lab.**

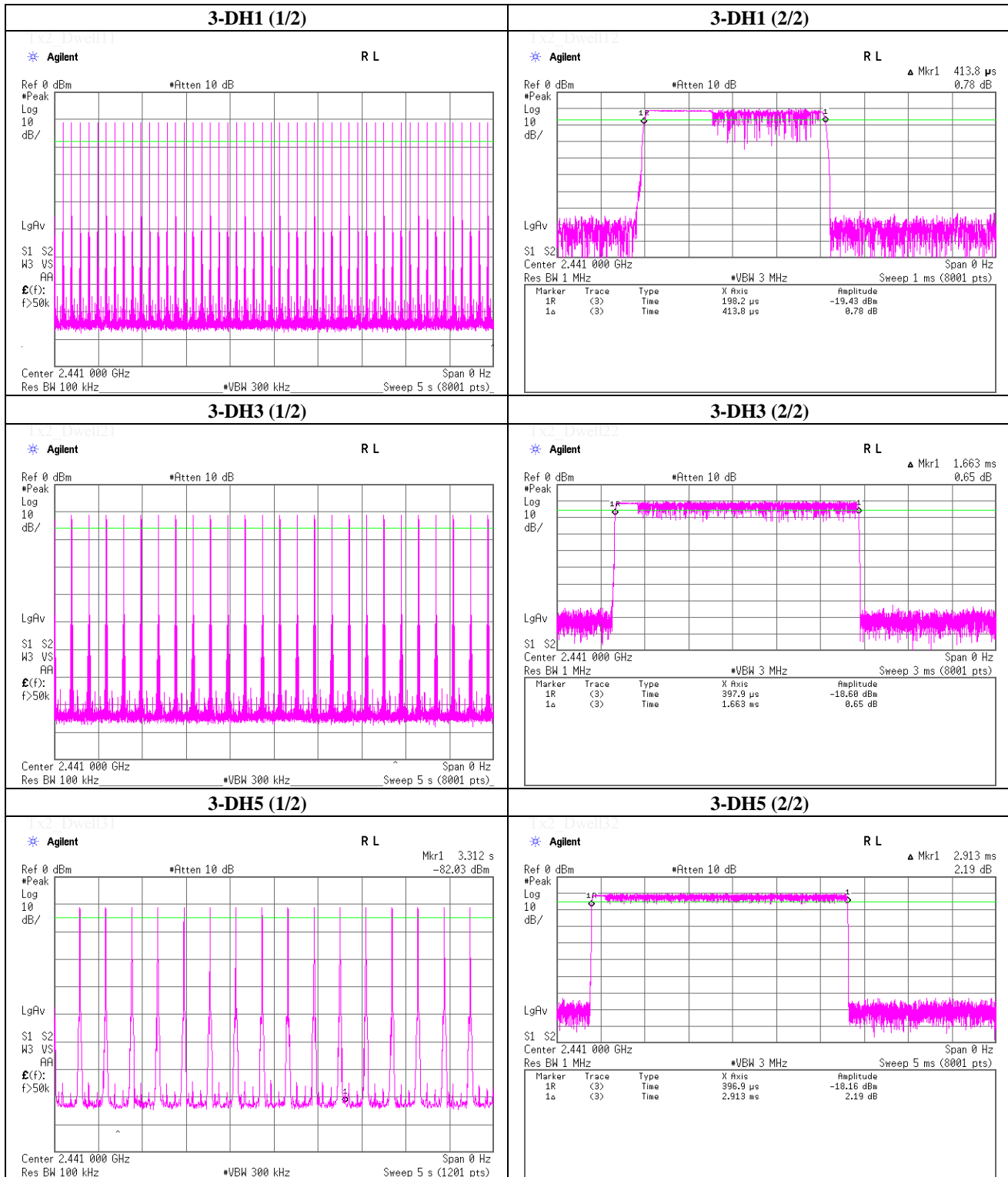
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Dwell time

### Tx, Bluetooth, EDR, PRBS9



**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

## Maximum Peak Conducted Output Power (Conducted)

Test place                   UL Japan, Inc. Shonan EMC Lab.      No.5 Shielded Room  
 Date                         November 5, 2012  
 Temperature / Humidity    25deg.C     , 43%RH  
 Engineer                  Tatsuya Arai  
 Mode                        Tx, Bluetooth

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

	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-11.93	1.44	10.00	-0.49	0.89	20.97	125	21.46
DH5	2441.0	-10.71	1.45	10.00	0.74	1.19	20.97	125	20.23
DH5	2480.0	-10.25	1.46	10.00	1.21	1.32	20.97	125	19.76
2-DH5	2402.0	-10.85	1.44	10.00	0.59	1.15	20.97	125	20.38
2-DH5	2441.0	-9.70	1.45	10.00	1.75	1.50	20.97	125	19.22
2-DH5	2480.0	-9.16	1.46	10.00	2.30	1.70	20.97	125	18.67
3-DH5	2402.0	-10.35	1.44	10.00	1.09	1.29	20.97	125	19.88
3-DH5	2441.0	-9.18	1.45	10.00	2.27	1.69	20.97	125	18.70
3-DH5	2480.0	-8.71	1.46	10.00	2.75	1.88	20.97	125	18.22

Sample Calculation:

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

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

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
Date                           November 8, 2012                                       November 9, 2012  
Temperature / Humidity    26 deg.C , 37 %RH                               25 deg.C , 40 %RH  
Engineer                    Tatsuya Arai   Tatsuya Arai  
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.	228.032	QP	45.9	16.7	8.1	32.0		38.7	46.0	7.3	148	123	
Hori.	607.555	QP	35.0	19.0	9.8	32.0		31.8	46.0	14.2	157	116	
Hori.	720.002	QP	37.9	20.4	10.2	31.8		36.7	46.0	9.3	145	299	
Hori.	815.999	QP	40.9	21.1	10.5	31.6		40.9	46.0	5.1	100	148	
Hori.	1104.059	PK	50.2	24.9	12.8	40.7		47.2	73.9	26.7	100	314	
Hori.	2390.000	PK	46.5	27.4	14.2	41.4		46.7	73.9	27.2	109	60	
Hori.	2400.000	PK	48.5	27.4	14.2	41.4		48.7	73.9	25.2	109	60	
Hori.	2506.000	PK	48.9	27.6	14.3	41.4		49.4	73.9	24.5	137	60	
Hori.	2532.084	PK	49.1	27.6	14.3	41.4		49.6	73.9	24.3	152	67	
Hori.	2558.096	PK	49.0	27.7	14.3	41.4		49.6	73.9	24.3	147	67	
Hori.	3145.707	PK	52.8	28.7	5.7	41.5		45.7	73.9	28.2	100	207	
Hori.	4804.000	PK	51.7	31.1	6.8	41.2		48.4	73.9	25.5	100	16	
Hori.	7206.000	PK	48.7	36.6	8.3	41.4		52.2	73.9	21.7	100	12	
Hori.	9608.000	PK	43.8	38.5	9.4	38.9		52.8	73.9	21.1	100	0	
Hori.	12010.000	PK	44.6	39.4	10.7	39.4		55.3	73.9	18.6	100	0	
Hori.	1104.059	AV	44.8	24.9	12.8	40.7		41.8	53.9	12.1	100	314	
Hori.	2390.000	AV	34.6	27.4	14.2	41.4		34.8	53.9	19.1	109	60	
Hori.	2400.000	AV	35.4	27.4	14.2	41.4		35.6	53.9	18.3	109	60	
Hori.	2506.000	AV	40.4	27.6	14.3	41.4		40.9	53.9	13.0	137	60	
Hori.	2532.084	AV	42.3	27.6	14.3	41.4		42.8	53.9	11.1	152	67	
Hori.	2558.096	AV	41.3	27.7	14.3	41.4		41.9	53.9	12.0	147	67	
Hori.	3145.707	AV	48.4	28.7	5.7	41.5		41.3	53.9	12.6	100	207	
Hori.	4804.000	AV	44.4	31.1	6.8	41.2		41.1	53.9	12.8	100	16	
Hori.	7206.000	AV	37.3	36.6	8.3	41.4		40.8	53.9	13.1	100	12	
Hori.	9608.000	AV	32.2	38.5	9.4	38.9		41.2	53.9	12.7	100	0	
Hori.	12010.000	AV	33.6	39.4	10.7	39.4		44.3	53.9	9.6	100	0	
Vert.	53.060	QP	40.1	10.0	6.7	32.2		24.6	40.0	15.4	100	0	
Vert.	228.032	QP	43.6	16.7	8.1	32.0		36.4	46.0	9.6	100	31	
Vert.	607.555	QP	35.9	19.0	9.8	32.0		32.7	46.0	13.3	100	356	
Vert.	720.002	QP	41.2	20.4	10.2	31.8		40.0	46.0	6.0	134	359	
Vert.	815.999	QP	41.1	21.1	10.5	31.6		41.1	46.0	4.9	100	8	
Vert.	1104.059	PK	49.9	24.9	12.8	40.7		46.9	73.9	27.0	100	13	
Vert.	2390.000	PK	46.4	27.4	14.2	41.4		46.6	73.9	27.3	100	93	
Vert.	2400.000	PK	47.8	27.4	14.2	41.4		48.0	73.9	25.9	100	93	
Vert.	2506.000	PK	47.6	27.6	14.3	41.4		48.1	73.9	25.8	100	326	
Vert.	2532.084	PK	48.1	27.6	14.3	41.4		48.6	73.9	25.3	100	325	
Vert.	2558.096	PK	48.8	27.7	14.3	41.4		49.4	73.9	24.5	100	327	
Vert.	3145.707	PK	53.1	28.7	5.7	41.5		46.0	73.9	27.9	152	194	
Vert.	4804.000	PK	52.8	31.1	6.8	41.2		49.5	73.9	24.4	103	141	
Vert.	7206.000	PK	48.1	36.6	8.3	41.4		51.6	73.9	22.3	100	218	
Vert.	9608.000	PK	44.5	38.5	9.4	38.9		53.5	73.9	20.4	100	0	
Vert.	12010.000	PK	45.2	39.4	10.7	39.4		55.9	73.9	18.0	100	0	
Vert.	1104.059	AV	44.5	24.9	12.8	40.7		41.5	53.9	12.4	100	13	
Vert.	2390.000	AV	34.0	27.4	14.2	41.4		34.2	53.9	19.7	100	93	
Vert.	2400.000	AV	35.3	27.4	14.2	41.4		35.5	53.9	18.4	100	93	
Vert.	2506.000	AV	38.7	27.6	14.3	41.4		39.2	53.9	14.7	100	326	
Vert.	2532.084	AV	39.0	27.6	14.3	41.4		39.5	53.9	14.4	100	325	
Vert.	2558.096	AV	40.2	27.7	14.3	41.4		40.8	53.9	13.1	100	327	
Vert.	3145.707	AV	48.2	28.7	5.7	41.5		41.1	53.9	12.8	152	194	
Vert.	4804.000	AV	46.0	31.1	6.8	41.2		42.7	53.9	11.2	103	141	
Vert.	7206.000	AV	36.7	36.6	8.3	41.4		40.2	53.9	13.7	100	218	
Vert.	9608.000	AV	32.2	38.5	9.4	38.9		41.2	53.9	12.7	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

**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

## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
Date                           November 8, 2012   November 9, 2012  
Temperature / Humidity    26 deg.C , 37 %RH                                   25 deg.C , 40 %RH  
Engineer                    Tatsuya Arai    Tatsuya Arai  
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.	228.051	QP	46.2	16.7	8.1	32.0		39.0	46.0	7.0	145	127	
Hori.	607.548	QP	35.1	19.0	9.8	32.0		31.9	46.0	14.1	151	116	
Hori.	720.004	QP	38.0	20.4	10.2	31.8		36.8	46.0	9.2	106	240	
Hori.	816.000	QP	41.7	21.1	10.5	31.6		41.7	46.0	<b>4.3</b>	100	215	
Hori.	1104.029	PK	50.1	24.9	12.8	40.7		47.1	73.9	26.8	100	314	
Hori.	2545.028	PK	49.1	27.6	14.3	41.4		49.6	73.9	24.3	136	65	
Hori.	2570.992	PK	47.6	27.7	14.3	41.4		48.2	73.9	25.7	153	69	
Hori.	2597.000	PK	47.7	27.7	14.4	41.4		48.4	73.9	25.5	156	70	
Hori.	3145.726	PK	52.7	28.7	5.7	41.5		45.6	73.9	28.3	100	206	
Hori.	4882.000	PK	52.5	31.3	6.9	41.1		49.6	73.9	24.3	100	158	
Hori.	7323.000	PK	48.7	36.6	8.6	41.4		52.5	73.9	21.4	126	356	
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.	1104.029	AV	43.9	24.9	12.8	40.7		40.9	53.9	13.0	100	314	
Hori.	2545.028	AV	40.3	27.6	14.3	41.4		40.8	53.9	13.1	136	65	
Hori.	2570.992	AV	38.0	27.7	14.3	41.4		38.6	53.9	15.3	153	69	
Hori.	2597.000	AV	37.5	27.7	14.4	41.4		38.2	53.9	15.7	156	70	
Hori.	3145.726	AV	48.5	28.7	5.7	41.5		41.4	53.9	12.5	100	206	
Hori.	4882.000	AV	45.7	31.3	6.9	41.1		42.8	53.9	11.1	100	158	
Hori.	7323.000	AV	38.3	36.6	8.6	41.4		42.1	53.9	11.8	126	356	
Hori.	9764.000	AV	32.4	38.7	9.5	38.9		41.7	53.9	12.2	100	0	
Hori.	12205.000	AV	33.8	39.5	10.8	39.3		44.8	53.9	9.1	100	0	
Vert.	53.040	QP	39.9	10.0	6.7	32.2		24.4	40.0	15.6	100	350	
Vert.	228.051	QP	43.8	16.7	8.1	32.0		36.6	46.0	9.4	100	1	
Vert.	607.548	QP	36.2	19.0	9.8	32.0		33.0	46.0	13.0	184	360	
Vert.	720.004	QP	42.2	20.4	10.2	31.8		41.0	46.0	5.0	100	0	
Vert.	816.000	QP	41.0	21.1	10.5	31.6		41.0	46.0	5.0	100	28	
Vert.	1104.029	PK	50.9	24.9	12.8	40.7		47.9	73.9	26.0	200	159	
Vert.	2545.028	PK	47.9	27.6	14.3	41.4		48.4	73.9	25.5	129	328	
Vert.	2570.992	PK	47.9	27.7	14.3	41.4		48.5	73.9	25.4	128	324	
Vert.	2597.000	PK	47.9	27.7	14.4	41.4		48.6	73.9	25.3	128	323	
Vert.	3145.726	PK	52.5	28.7	5.7	41.5		45.4	73.9	28.5	150	187	
Vert.	4882.000	PK	53.6	31.3	6.9	41.1		50.7	73.9	23.2	100	40	
Vert.	7323.000	PK	49.8	36.6	8.6	41.4		53.6	73.9	20.3	183	346	
Vert.	9764.000	PK	44.1	38.7	9.5	38.9		53.4	73.9	20.5	100	0	
Vert.	12205.000	PK	45.6	39.5	10.8	39.3		56.6	73.9	17.3	100	0	
Vert.	1104.029	AV	45.6	24.9	12.8	40.7		42.6	53.9	11.3	200	159	
Vert.	2545.028	AV	39.1	27.6	14.3	41.4		39.6	53.9	14.3	129	328	
Vert.	2570.992	AV	37.6	27.7	14.3	41.4		38.2	53.9	15.7	128	324	
Vert.	2597.000	AV	38.0	27.7	14.4	41.4		38.7	53.9	15.2	128	323	
Vert.	3145.726	AV	48.1	28.7	5.7	41.5		41.0	53.9	12.9	150	187	
Vert.	4882.000	AV	47.2	31.3	6.9	41.1		44.3	53.9	9.6	100	40	
Vert.	7323.000	AV	38.9	36.6	8.6	41.4		42.7	53.9	11.2	183	346	
Vert.	9764.000	AV	32.3	38.7	9.5	38.9		41.6	53.9	12.3	100	0	
Vert.	12205.000	AV	33.7	39.5	10.8	39.3		44.7	53.9	9.2	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

**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

## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
Date                           November 8, 2012   November 9, 2012  
Temperature / Humidity    26 deg.C , 37 %RH                                   25 deg.C , 40 %RH  
Engineer                    Tatsuya Arai   Tatsuya Arai  
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.	228.049	QP	46.2	16.7	8.1	32.0		39.0	46.0	7.0	150	128	
Hori.	607.604	QP	35.1	19.0	9.8	32.0		31.9	46.0	14.1	158	119	
Hori.	720.002	QP	38.3	20.4	10.2	31.8		37.1	46.0	8.9	133	157	
Hori.	816.001	QP	41.1	21.1	10.5	31.6		41.1	46.0	4.9	100	314	
Hori.	1104.051	PK	50.5	24.9	12.8	40.7		47.5	73.9	26.4	100	311	
Hori.	2483.500	PK	46.2	27.5	14.3	41.4		46.6	73.9	27.3	136	61	
Hori.	2584.019	PK	47.2	27.7	14.3	41.4		47.8	73.9	26.1	155	74	
Hori.	2610.000	PK	47.8	27.8	14.4	41.4		48.6	73.9	25.3	154	75	
Hori.	2636.033	PK	46.8	27.8	14.4	41.4		47.6	73.9	26.3	156	78	
Hori.	3145.734	PK	53.5	28.7	5.7	41.5		46.4	73.9	27.5	100	208	
Hori.	4960.000	PK	51.5	31.6	6.9	41.0		49.0	73.9	24.9	100	358	
Hori.	7440.000	PK	48.4	36.7	8.8	41.5		52.4	73.9	21.5	100	0	
Hori.	9920.000	PK	44.7	39.0	9.7	38.9		54.5	73.9	19.4	100	0	
Hori.	12400.000	PK	45.3	39.5	10.8	39.3		56.3	73.9	17.6	100	0	
Hori.	1104.051	AV	44.5	24.9	12.8	40.7		41.5	53.9	12.4	100	311	
Hori.	2483.500	AV	34.4	27.5	14.3	41.4		34.8	53.9	19.1	136	61	
Hori.	2584.019	AV	37.2	27.7	14.3	41.4		37.8	53.9	16.1	155	74	
Hori.	2610.000	AV	35.9	27.8	14.4	41.4		36.7	53.9	17.2	154	75	
Hori.	2636.033	AV	35.9	27.8	14.4	41.4		36.7	53.9	17.2	156	78	
Hori.	3145.734	AV	50.2	28.7	5.7	41.5		43.1	53.9	10.8	100	208	
Hori.	4960.000	AV	44.5	31.6	6.9	41.0		42.0	53.9	11.9	100	358	
Hori.	7440.000	AV	36.6	36.7	8.8	41.5		40.6	53.9	13.3	100	0	
Hori.	9920.000	AV	32.6	39.0	9.7	38.9		42.4	53.9	11.5	100	0	
Hori.	12400.000	AV	33.6	39.5	10.8	39.3		44.6	53.9	9.3	100	0	
Vert.	53.050	QP	40.1	10.0	6.7	32.2		24.6	40.0	15.4	100	345	
Vert.	228.049	QP	44.0	16.7	8.1	32.0		36.8	46.0	9.2	100	10	
Vert.	607.604	QP	37.2	19.0	9.8	32.0		34.0	46.0	12.0	100	5	
Vert.	720.002	QP	41.5	20.4	10.2	31.8		40.3	46.0	5.7	100	358	
Vert.	816.001	QP	41.2	21.1	10.5	31.6		41.2	46.0	4.8	100	10	
Vert.	1104.051	PK	49.6	24.9	12.8	40.7		46.6	73.9	27.3	100	11	
Vert.	2483.500	PK	46.8	27.5	14.3	41.4		47.2	73.9	26.7	100	326	
Vert.	2584.019	PK	48.0	27.7	14.3	41.4		48.6	73.9	25.3	100	331	
Vert.	2610.000	PK	46.7	27.8	14.4	41.4		47.5	73.9	26.4	119	318	
Vert.	2636.033	PK	48.0	27.8	14.4	41.4		48.8	73.9	25.1	132	319	
Vert.	3145.734	PK	54.6	28.7	5.7	41.5		47.5	73.9	26.4	146	187	
Vert.	4960.000	PK	52.2	31.6	6.9	41.0		49.7	73.9	24.2	100	175	
Vert.	7440.000	PK	50.0	36.7	8.8	41.5		54.0	73.9	19.9	132	329	
Vert.	9920.000	PK	44.8	39.0	9.7	38.9		54.6	73.9	19.3	100	0	
Vert.	12400.000	PK	45.8	39.5	10.8	39.3		56.8	73.9	17.1	100	0	
Vert.	1104.051	AV	43.7	24.9	12.8	40.7		40.7	53.9	13.2	100	11	
Vert.	2483.500	AV	34.2	27.5	14.3	41.4		34.6	53.9	19.3	100	326	
Vert.	2584.019	AV	37.1	27.7	14.3	41.4		37.7	53.9	16.2	100	331	
Vert.	2610.000	AV	36.2	27.8	14.4	41.4		37.0	53.9	16.9	119	318	
Vert.	2636.033	AV	37.2	27.8	14.4	41.4		38.0	53.9	15.9	132	319	
Vert.	3145.734	AV	51.2	28.7	5.7	41.5		44.1	53.9	9.8	146	187	
Vert.	4960.000	AV	44.7	31.6	6.9	41.0		42.2	53.9	11.7	100	175	
Vert.	7440.000	AV	38.0	36.7	8.8	41.5		42.0	53.9	11.9	132	329	
Vert.	9920.000	AV	32.5	39.0	9.7	38.9		42.3	53.9	11.6	100	0	
Vert.	12400.000	AV	33.6	39.5	10.8	39.3		44.6	53.9	9.3	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

**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

## Radiated Emission

Test place                      UL Japan, Inc. Shonan EMC Lab.                      No.3 Semi Anechoic Chamber  
Date                                      November 8, 2012                                      November 9, 2012  
Temperature / Humidity              26 deg.C , 37 %RH                                      25 deg.C , 40 %RH  
Engineer                                      Tatsuya Arai                                      Tatsuya Arai  
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.	228.022	QP	46.1	16.7	8.1	32.0	38.9	46.0	7.1	153	127	
Hori.	607.528	QP	35.5	19.0	9.8	32.0	32.3	46.0	13.7	154	122	
Hori.	720.001	QP	38.3	20.4	10.2	31.8	37.1	46.0	8.9	138	311	
Hori.	815.998	QP	40.8	21.1	10.5	31.6	40.8	46.0	5.2	100	323	
Hori.	1104.019	PK	49.5	24.9	12.8	40.7	46.5	73.9	27.4	100	311	
Hori.	2390.000	PK	46.2	27.4	14.2	41.4	46.4	73.9	27.5	100	311	
Hori.	2400.000	PK	54.0	27.4	14.2	41.4	54.2	73.9	19.7	100	311	
Hori.	2506.072	PK	47.8	27.6	14.3	41.4	48.3	73.9	25.6	100	304	
Hori.	2532.063	PK	48.2	27.6	14.3	41.4	48.7	73.9	25.2	100	304	
Hori.	2558.030	PK	48.1	27.7	14.3	41.4	48.7	73.9	25.2	100	301	
Hori.	3145.707	PK	53.9	28.7	5.7	41.5	46.8	73.9	27.1	100	207	
Hori.	4804.000	PK	50.9	31.1	6.8	41.2	47.6	73.9	26.3	110	19	
Hori.	7206.000	PK	49.1	36.6	8.3	41.4	52.6	73.9	21.3	114	359	
Hori.	9608.000	PK	43.9	38.5	9.4	38.9	52.9	73.9	21.0	100	0	
Hori.	12010.000	PK	45.0	39.4	10.7	39.4	55.7	73.9	18.2	100	0	
Hori.	1104.019	AV	43.1	24.9	12.8	40.7	40.1	53.9	13.8	100	311	
Hori.	2390.000	AV	34.1	27.4	14.2	41.4	34.3	53.9	19.6	100	311	
Hori.	2400.000	AV	39.6	27.4	14.2	41.4	39.8	53.9	14.1	100	311	
Hori.	2506.072	AV	37.9	27.6	14.3	41.4	38.4	53.9	15.5	100	304	
Hori.	2532.063	AV	38.1	27.6	14.3	41.4	38.6	53.9	15.3	100	304	
Hori.	2558.030	AV	38.7	27.7	14.3	41.4	39.3	53.9	14.6	100	301	
Hori.	3145.707	AV	50.3	28.7	5.7	41.5	43.2	53.9	10.7	100	207	
Hori.	4804.000	AV	41.1	31.1	6.8	41.2	37.8	53.9	16.1	110	19	
Hori.	7206.000	AV	36.7	36.6	8.3	41.4	40.2	53.9	13.7	114	359	
Hori.	9608.000	AV	32.2	38.5	9.4	38.9	41.2	53.9	12.7	100	0	
Hori.	12010.000	AV	33.6	39.4	10.7	39.4	44.3	53.9	9.6	100	0	
Vert.	53.050	QP	40.0	10.0	6.7	32.2	24.5	40.0	15.5	100	0	
Vert.	228.022	QP	43.8	16.7	8.1	32.0	36.6	46.0	9.4	100	359	
Vert.	607.528	QP	36.5	19.0	9.8	32.0	33.3	46.0	12.7	100	5	
Vert.	720.001	QP	40.9	20.4	10.2	31.8	39.7	46.0	6.3	127	359	
Vert.	815.998	QP	41.2	21.1	10.5	31.6	41.2	46.0	4.8	100	9	
Vert.	1104.019	PK	48.7	24.9	12.8	40.7	45.7	73.9	28.2	100	18	
Vert.	2390.000	PK	47.1	27.4	14.2	41.4	47.3	73.9	26.6	100	94	
Vert.	2400.000	PK	53.5	27.4	14.2	41.4	53.7	73.9	20.2	100	94	
Vert.	2506.072	PK	47.7	27.6	14.3	41.4	48.2	73.9	25.7	129	328	
Vert.	2532.063	PK	48.1	27.6	14.3	41.4	48.6	73.9	25.3	100	325	
Vert.	2558.030	PK	48.3	27.7	14.3	41.4	48.9	73.9	25.0	100	326	
Vert.	3145.707	PK	54.3	28.7	5.7	41.5	47.2	73.9	26.7	146	187	
Vert.	4804.000	PK	51.3	31.1	6.8	41.2	48.0	73.9	25.9	103	139	
Vert.	7206.000	PK	47.4	36.6	8.3	41.4	50.9	73.9	23.0	100	0	
Vert.	9608.000	PK	43.2	38.5	9.4	38.9	52.2	73.9	21.7	100	0	
Vert.	12010.000	PK	45.1	39.4	10.7	39.4	55.8	73.9	18.1	100	0	
Vert.	1104.019	AV	42.2	24.9	12.8	40.7	39.2	53.9	14.7	100	18	
Vert.	2390.000	AV	34.1	27.4	14.2	41.4	34.3	53.9	19.6	100	94	
Vert.	2400.000	AV	38.9	27.4	14.2	41.4	39.1	53.9	14.8	100	94	
Vert.	2506.072	AV	37.4	27.6	14.3	41.4	37.9	53.9	16.0	129	328	
Vert.	2532.063	AV	37.6	27.6	14.3	41.4	38.1	53.9	15.8	100	325	
Vert.	2558.030	AV	38.6	27.7	14.3	41.4	39.2	53.9	14.7	100	326	
Vert.	3145.707	AV	50.9	28.7	5.7	41.5	43.8	53.9	10.1	146	187	
Vert.	4804.000	AV	42.0	31.1	6.8	41.2	38.7	53.9	15.2	103	139	
Vert.	7206.000	AV	36.0	36.6	8.3	41.4	39.5	53.9	14.4	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	33.6	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) + 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 :                       $20\log(3.0m/1.0m)= 9.5dB$ **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

## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
Date                           November 8, 2012   November 9, 2012  
Temperature / Humidity    26 deg.C , 37 %RH                                   25 deg.C , 40 %RH  
Engineer                    Tatsuya Arai    Tatsuya Arai  
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.	227.985	QP	46.0	16.7	8.1	32.0		38.8	46.0	7.2	147	131	
Hori.	607.526	QP	35.4	19.0	9.8	32.0		32.2	46.0	13.8	159	121	
Hori.	720.002	QP	38.0	20.4	10.2	31.8		36.8	46.0	9.2	136	309	
Hori.	816.003	QP	40.8	21.1	10.5	31.6		40.8	46.0	5.2	100	211	
Hori.	1104.046	PK	48.1	24.9	12.8	40.7		45.1	73.9	28.8	100	311	
Hori.	2545.124	PK	48.5	27.6	14.3	41.4		49.0	73.9	24.9	167	64	
Hori.	2571.146	PK	47.5	27.7	14.3	41.4		48.1	73.9	25.8	190	70	
Hori.	2596.980	PK	47.3	27.7	14.4	41.4		48.0	73.9	25.9	191	70	
Hori.	3145.728	PK	54.1	28.7	5.7	41.5		47.0	73.9	26.9	100	207	
Hori.	4882.000	PK	55.1	31.3	6.9	41.1		52.2	73.9	21.7	100	138	
Hori.	7323.000	PK	48.6	36.6	8.6	41.4		52.4	73.9	21.5	127	358	
Hori.	9764.000	PK	43.7	38.7	9.5	38.9		53.0	73.9	20.9	100	0	
Hori.	12205.000	PK	45.0	39.5	10.8	39.3		56.0	73.9	17.9	100	0	
Hori.	1104.046	AV	40.1	24.9	12.8	40.7		37.1	53.9	16.8	100	311	
Hori.	2545.124	AV	38.8	27.6	14.3	41.4		39.3	53.9	14.6	167	64	
Hori.	2571.146	AV	36.7	27.7	14.3	41.4		37.3	53.9	16.6	190	70	
Hori.	2596.980	AV	36.5	27.7	14.4	41.4		37.2	53.9	16.7	191	70	
Hori.	3145.728	AV	50.2	28.7	5.7	41.5		43.1	53.9	10.8	100	207	
Hori.	4882.000	AV	46.5	31.3	6.9	41.1		43.6	53.9	10.3	100	138	
Hori.	7323.000	AV	37.1	36.6	8.6	41.4		40.9	53.9	13.0	127	358	
Hori.	9764.000	AV	32.4	38.7	9.5	38.9		41.7	53.9	12.2	100	0	
Hori.	12205.000	AV	33.7	39.5	10.8	39.3		44.7	53.9	9.2	100	0	
Vert.	53.500	QP	40.2	9.8	6.7	32.2		24.5	40.0	15.5	100	2	
Vert.	227.985	QP	43.9	16.7	8.1	32.0		36.7	46.0	9.3	100	31	
Vert.	607.526	QP	36.8	19.0	9.8	32.0		33.6	46.0	12.4	100	5	
Vert.	720.002	QP	41.1	20.4	10.2	31.8		39.9	46.0	6.1	129	359	
Vert.	816.003	QP	41.2	21.1	10.5	31.6		41.2	46.0	4.8	100	8	
Vert.	1104.046	PK	49.7	24.9	12.8	40.7		46.7	73.9	27.2	155	359	
Vert.	2545.124	PK	47.7	27.6	14.3	41.4		48.2	73.9	25.7	124	325	
Vert.	2571.146	PK	47.3	27.7	14.3	41.4		47.9	73.9	26.0	100	325	
Vert.	2596.980	PK	47.7	27.7	14.4	41.4		48.4	73.9	25.5	132	324	
Vert.	3145.728	PK	54.1	28.7	5.7	41.5		47.0	73.9	26.9	132	186	
Vert.	4882.000	PK	53.4	31.3	6.9	41.1		50.5	73.9	23.4	100	105	
Vert.	7323.000	PK	48.7	36.6	8.6	41.4		52.5	73.9	21.4	100	345	
Vert.	9764.000	PK	43.6	38.7	9.5	38.9		52.9	73.9	21.0	100	0	
Vert.	12205.000	PK	45.2	39.5	10.8	39.3		56.2	73.9	17.7	100	0	
Vert.	1104.046	AV	43.6	24.9	12.8	40.7		40.6	53.9	13.3	155	359	
Vert.	2545.124	AV	37.6	27.6	14.3	41.4		38.1	53.9	15.8	124	325	
Vert.	2571.146	AV	36.6	27.7	14.3	41.4		37.2	53.9	16.7	100	325	
Vert.	2596.980	AV	37.0	27.7	14.4	41.4		37.7	53.9	16.2	132	324	
Vert.	3145.728	AV	50.7	28.7	5.7	41.5		43.6	53.9	10.3	132	186	
Vert.	4882.000	AV	44.1	31.3	6.9	41.1		41.2	53.9	12.7	100	105	
Vert.	7323.000	AV	37.5	36.6	8.6	41.4		41.3	53.9	12.6	100	345	
Vert.	9764.000	AV	32.3	38.7	9.5	38.9		41.6	53.9	12.3	100	0	
Vert.	12205.000	AV	33.7	39.5	10.8	39.3		44.7	53.9	9.2	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

**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



## Radiated Emission

Test place                   UL Japan, Inc. Shonan EMC Lab.                   No.3 Semi Anechoic Chamber  
Date                           November 8, 2012                                       November 9, 2012  
Temperature / Humidity    26 deg.C , 37 %RH                               25 deg.C , 40 %RH  
Engineer                    Tatsuya Arai   Tatsuya Arai  
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.	228.023	QP	46.1	16.7	8.1	32.0	38.9	46.0	7.1	147	128	
Hori.	607.619	QP	34.9	19.0	9.8	32.0	31.7	46.0	14.3	160	121	
Hori.	720.000	QP	37.8	20.4	10.2	31.8	36.6	46.0	9.4	146	301	
Hori.	816.000	QP	41.0	21.1	10.5	31.6	41.0	46.0	5.0	100	152	
Hori.	1104.007	PK	49.2	24.9	12.8	40.7	46.2	73.9	27.7	100	310	
Hori.	2483.500	PK	47.1	27.5	14.3	41.4	47.5	73.9	26.4	132	61	
Hori.	2584.037	PK	46.9	27.7	14.3	41.4	47.5	73.9	26.4	143	72	
Hori.	2610.053	PK	46.9	27.8	14.4	41.4	47.7	73.9	26.2	201	71	
Hori.	2636.036	PK	47.1	27.8	14.4	41.4	47.9	73.9	26.0	192	71	
Hori.	3145.707	PK	53.8	28.7	5.7	41.5	46.7	73.9	27.2	100	207	
Hori.	4960.000	PK	51.0	31.6	6.9	41.0	48.5	73.9	25.4	100	358	
Hori.	7440.000	PK	48.9	36.7	8.8	41.5	52.9	73.9	21.0	100	1	
Hori.	9920.000	PK	44.1	39.0	9.7	38.9	53.9	73.9	20.0	100	0	
Hori.	12400.000	PK	46.4	39.5	10.8	39.3	57.4	73.9	16.5	100	0	
Hori.	1104.007	AV	43.1	24.9	12.8	40.7	40.1	53.9	13.8	100	310	
Hori.	2483.500	AV	34.3	27.5	14.3	41.4	34.7	53.9	19.2	132	61	
Hori.	2584.037	AV	36.4	27.7	14.3	41.4	37.0	53.9	16.9	143	72	
Hori.	2610.053	AV	35.5	27.8	14.4	41.4	36.3	53.9	17.6	201	71	
Hori.	2636.036	AV	35.6	27.8	14.4	41.4	36.4	53.9	17.5	192	71	
Hori.	3145.707	AV	50.4	28.7	5.7	41.5	43.3	53.9	10.6	100	207	
Hori.	4960.000	AV	41.2	31.6	6.9	41.0	38.7	53.9	15.2	100	358	
Hori.	7440.000	AV	36.4	36.7	8.8	41.5	40.4	53.9	13.5	100	1	
Hori.	9920.000	AV	32.6	39.0	9.7	38.9	42.4	53.9	11.5	100	0	
Hori.	12400.000	AV	33.7	39.5	10.8	39.3	44.7	53.9	9.2	100	0	
Vert.	53.050	QP	40.1	10.0	6.7	32.2	24.6	40.0	15.4	100	0	
Vert.	228.023	QP	43.7	16.7	8.1	32.0	36.5	46.0	9.5	100	348	
Vert.	607.619	QP	35.9	19.0	9.8	32.0	32.7	46.0	13.3	100	5	
Vert.	720.000	QP	41.0	20.4	10.2	31.8	39.8	46.0	6.2	136	359	
Vert.	816.000	QP	41.2	21.1	10.5	31.6	41.2	46.0	4.8	100	8	
Vert.	1104.007	PK	49.3	24.9	12.8	40.7	46.3	73.9	27.6	100	16	
Vert.	2483.500	PK	47.9	27.5	14.3	41.4	48.3	73.9	25.6	100	326	
Vert.	2584.037	PK	46.6	27.7	14.3	41.4	47.2	73.9	26.7	108	325	
Vert.	2610.053	PK	46.4	27.8	14.4	41.4	47.2	73.9	26.7	108	325	
Vert.	2636.036	PK	47.1	27.8	14.4	41.4	47.9	73.9	26.0	108	325	
Vert.	3145.707	PK	54.2	28.7	5.7	41.5	47.1	73.9	26.8	147	189	
Vert.	4960.000	PK	50.8	31.6	6.9	41.0	48.3	73.9	25.6	100	176	
Vert.	7440.000	PK	48.9	36.7	8.8	41.5	52.9	73.9	21.0	132	329	
Vert.	9920.000	PK	44.1	39.0	9.7	38.9	53.9	73.9	20.0	100	0	
Vert.	12400.000	PK	46.1	39.5	10.8	39.3	57.1	73.9	16.8	100	0	
Vert.	1104.007	AV	42.9	24.9	12.8	40.7	39.9	53.9	14.0	100	16	
Vert.	2483.500	AV	34.1	27.5	14.3	41.4	34.5	53.9	19.4	100	326	
Vert.	2584.037	AV	36.1	27.7	14.3	41.4	36.7	53.9	17.2	108	325	
Vert.	2610.053	AV	35.5	27.8	14.4	41.4	36.3	53.9	17.6	108	325	
Vert.	2636.036	AV	35.6	27.8	14.4	41.4	36.4	53.9	17.5	108	325	
Vert.	3145.707	AV	50.6	28.7	5.7	41.5	43.5	53.9	10.4	147	189	
Vert.	4960.000	AV	41.2	31.6	6.9	41.0	38.7	53.9	15.2	100	176	
Vert.	7440.000	AV	37.5	36.7	8.8	41.5	41.5	53.9	12.4	132	329	
Vert.	9920.000	AV	32.6	39.0	9.7	38.9	42.4	53.9	11.5	100	0	
Vert.	12400.000	AV	33.7	39.5	10.8	39.3	44.7	53.9	9.2	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

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

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

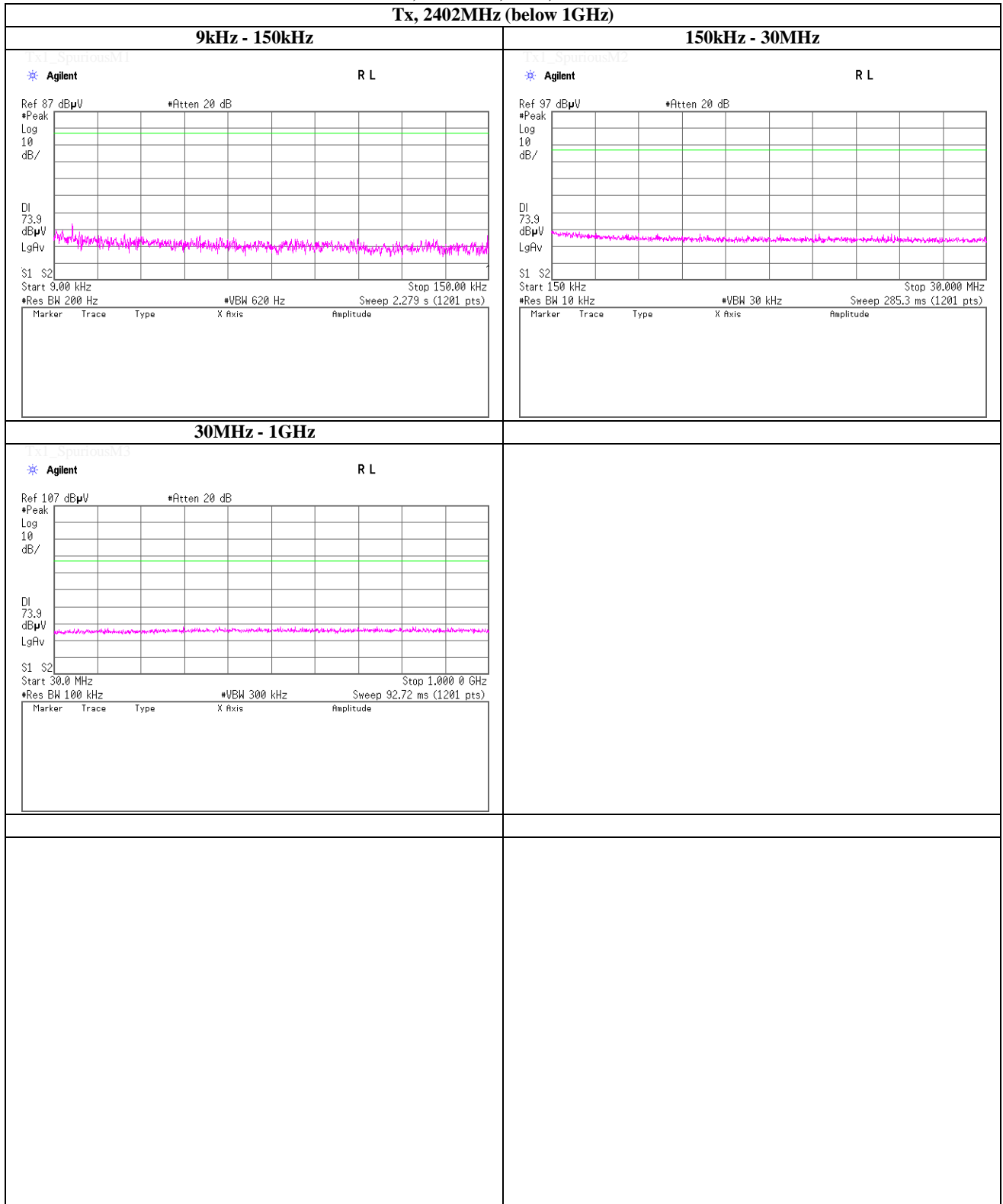
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

**Tx, Bluetooth, BDR, PRBS9**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

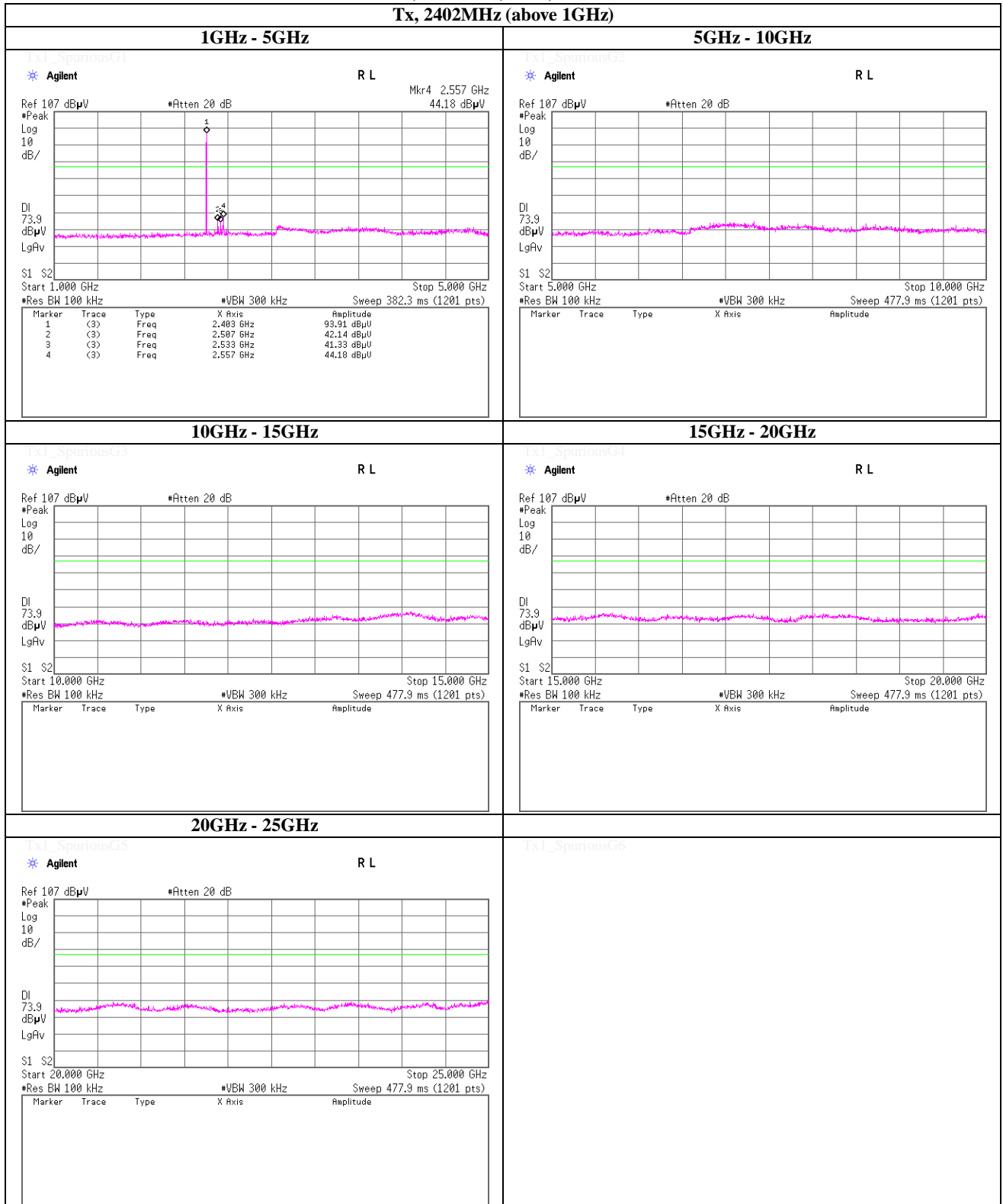
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

**Tx, Bluetooth, BDR, PRBS9**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

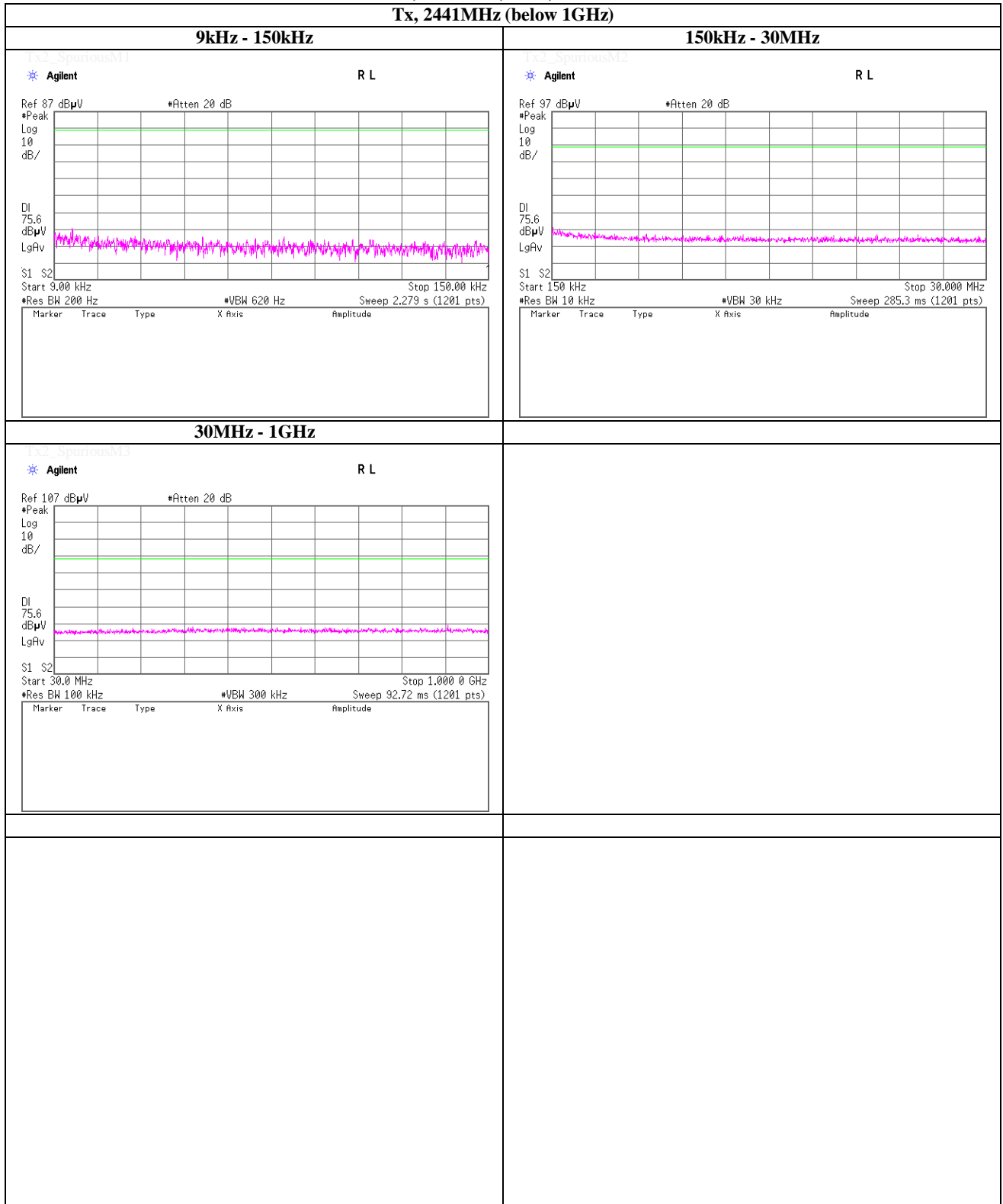
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

**Tx, Bluetooth, BDR, PRBS9**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

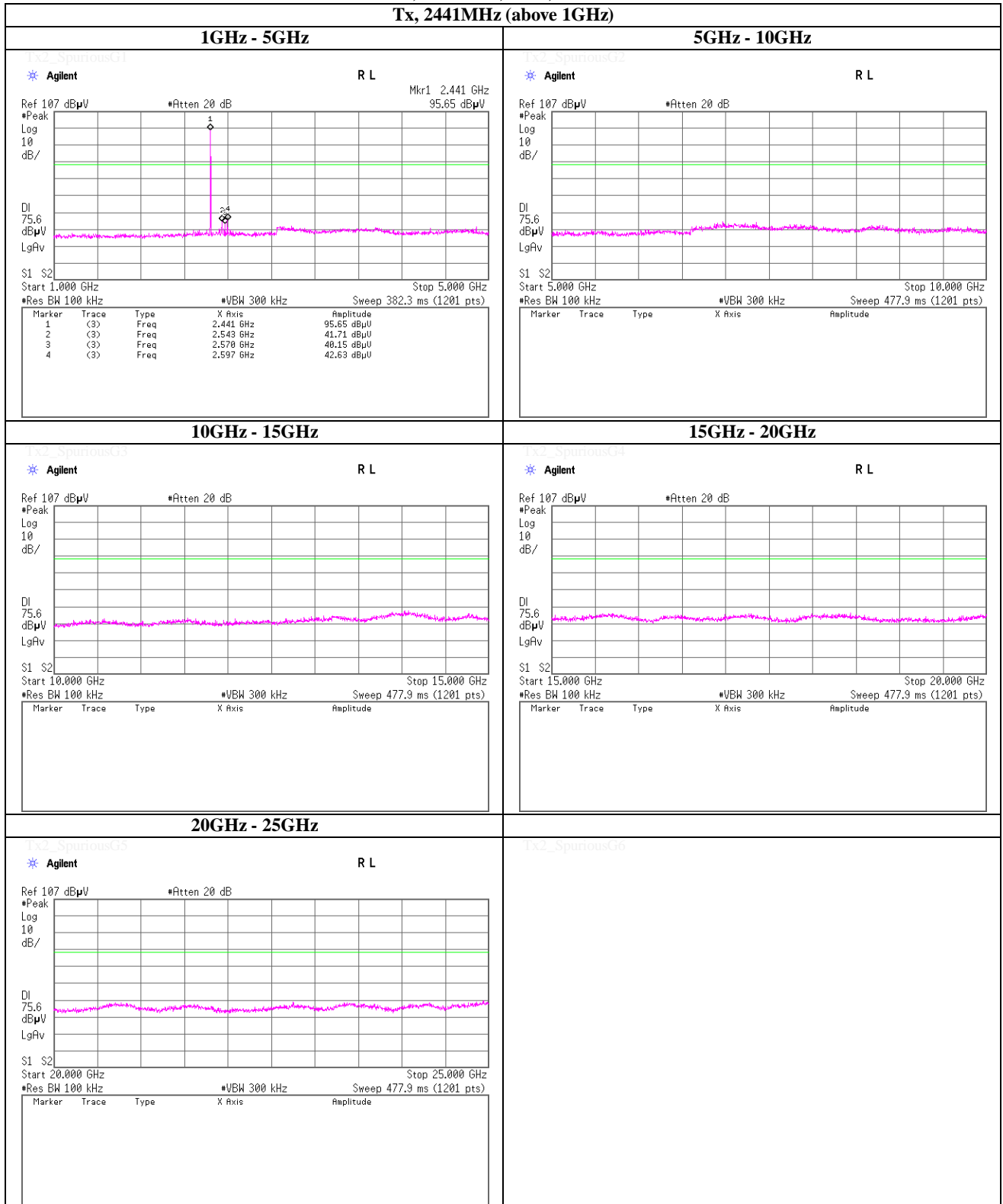
Telephone : +81 463 50 6400

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

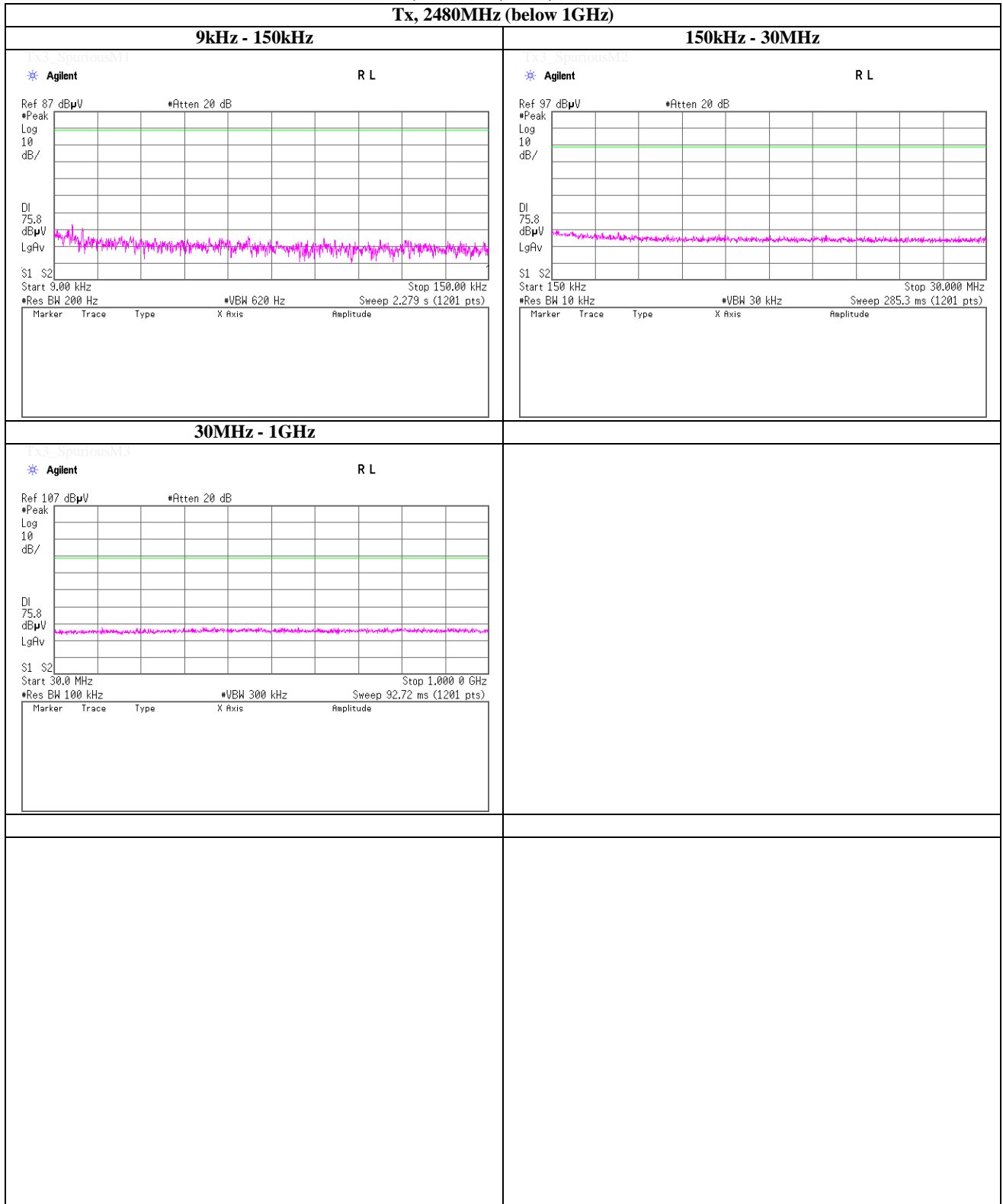
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Spurious emission (Conducted)

**Tx, Bluetooth, BDR, PRBS9**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

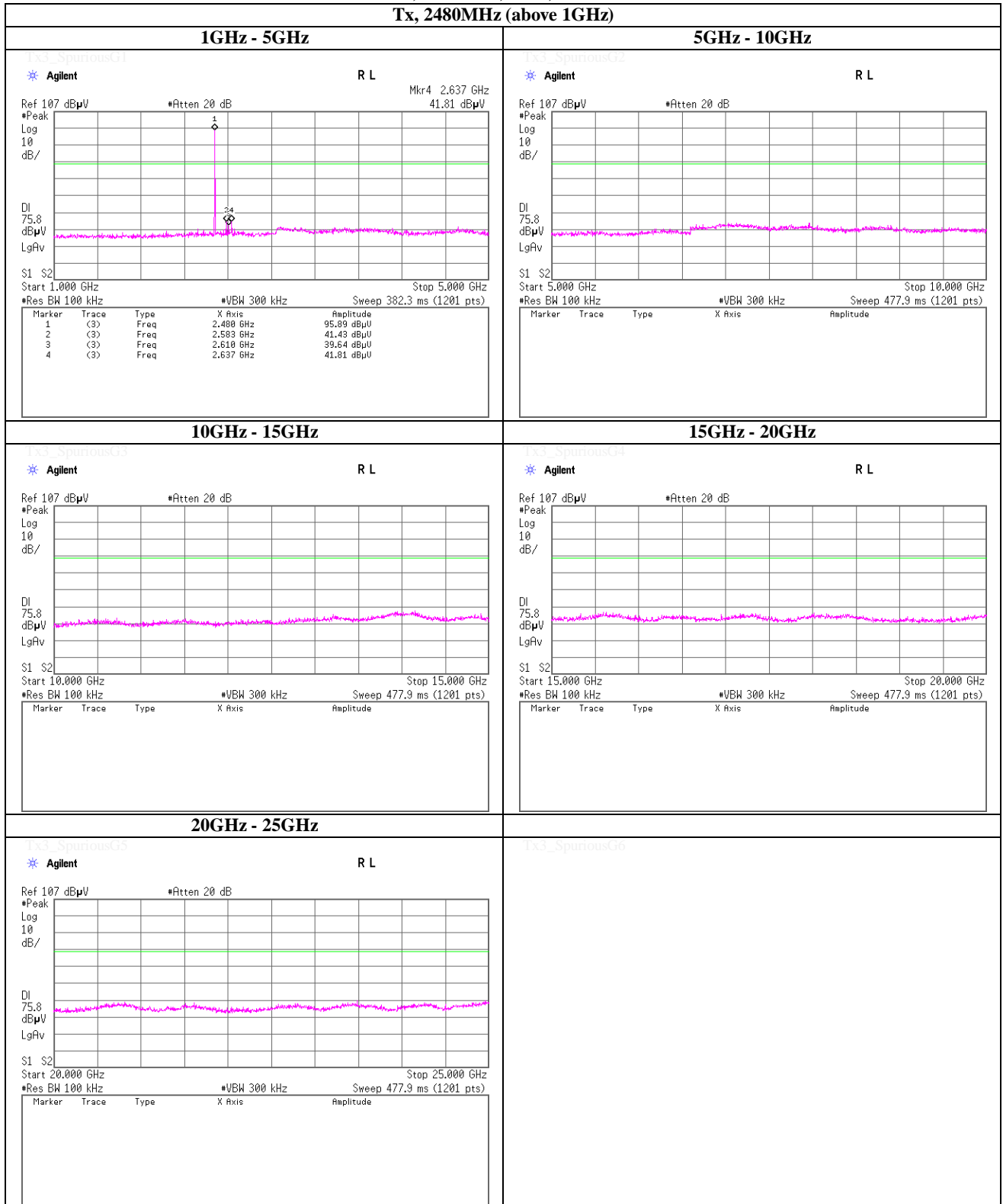
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

**Tx, Bluetooth, BDR, PRBS9**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

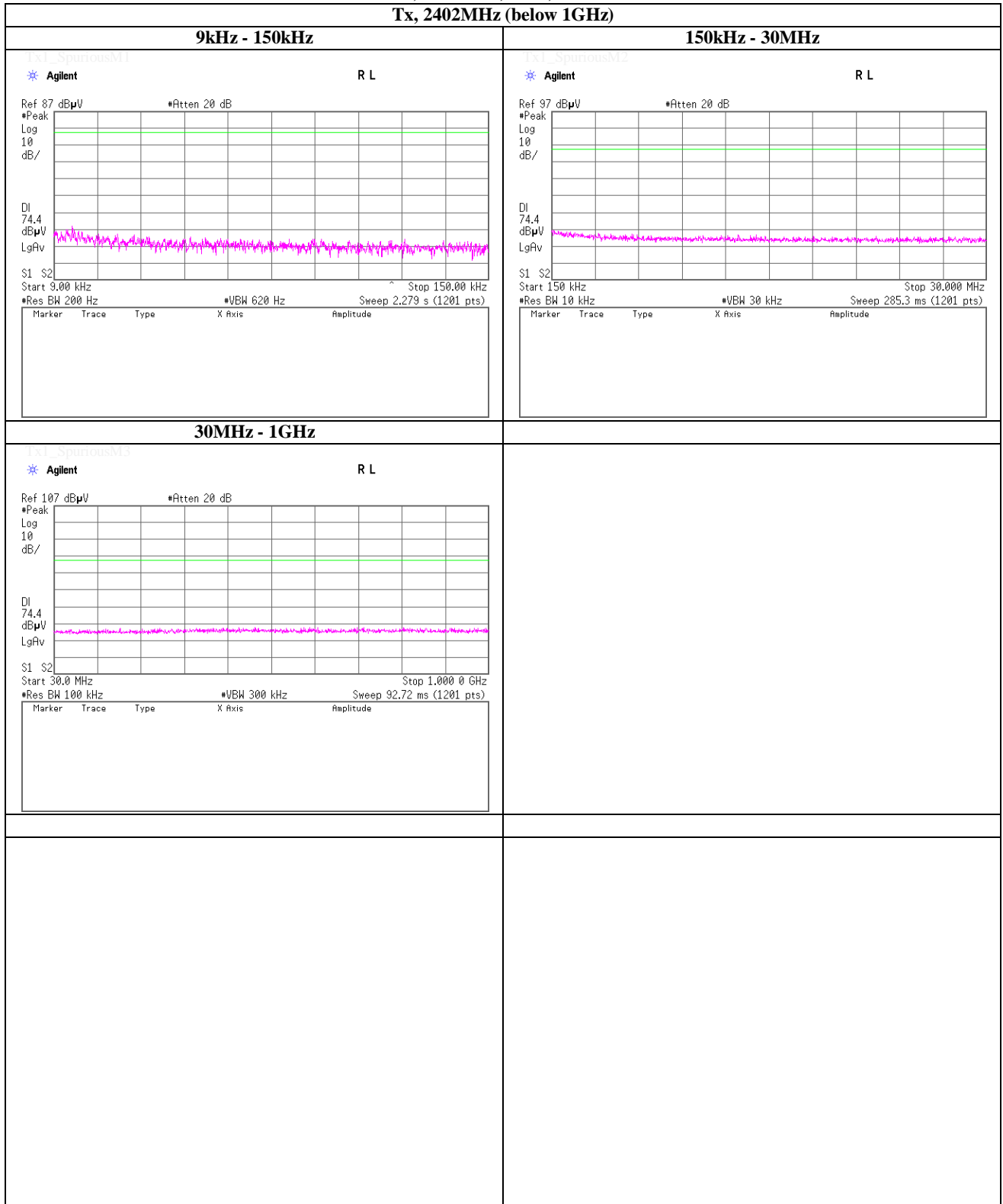
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (below 1GHz)



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

Telephone : +81 463 50 6400

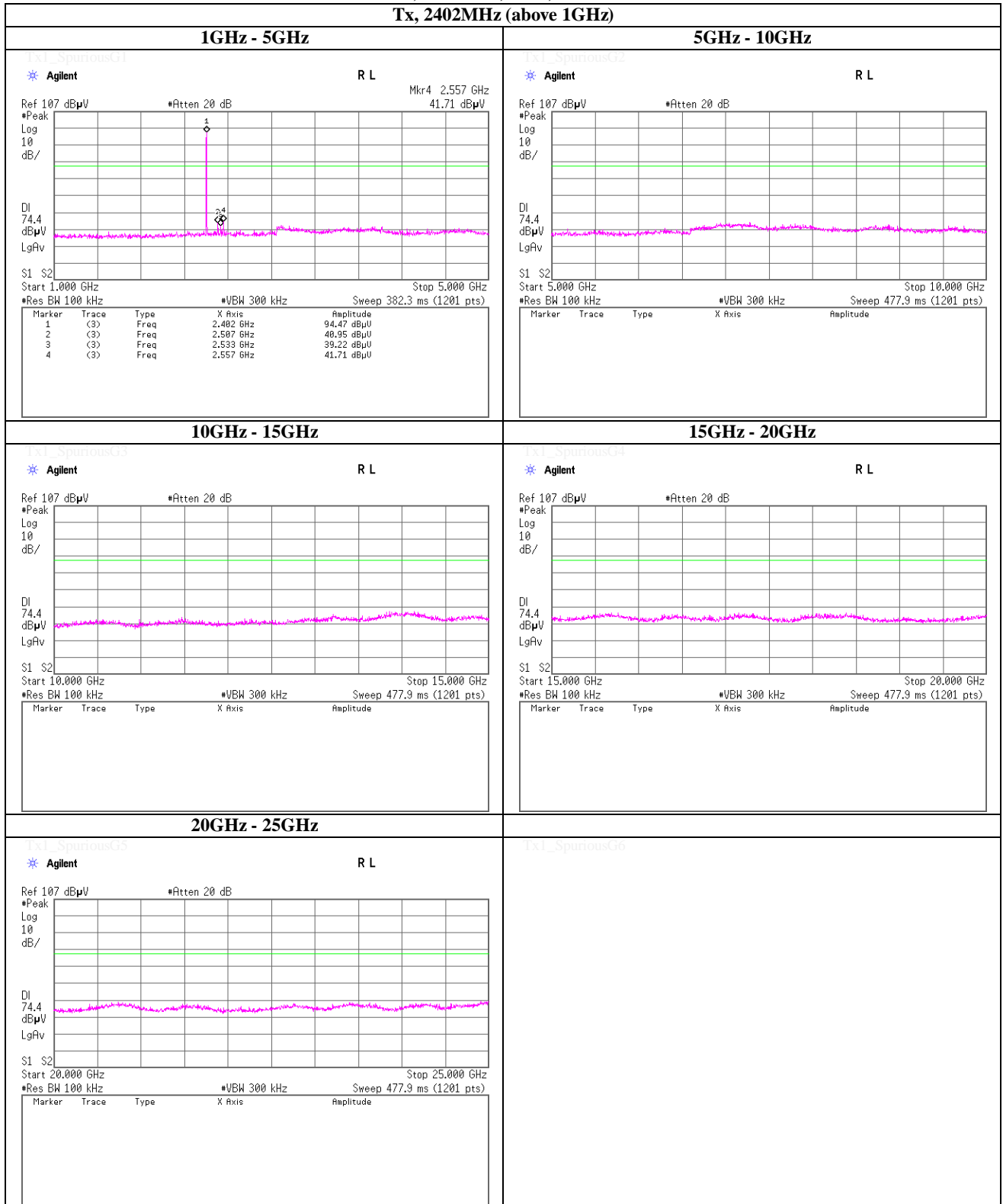
Facsimile : +81 463 50 6401



### 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

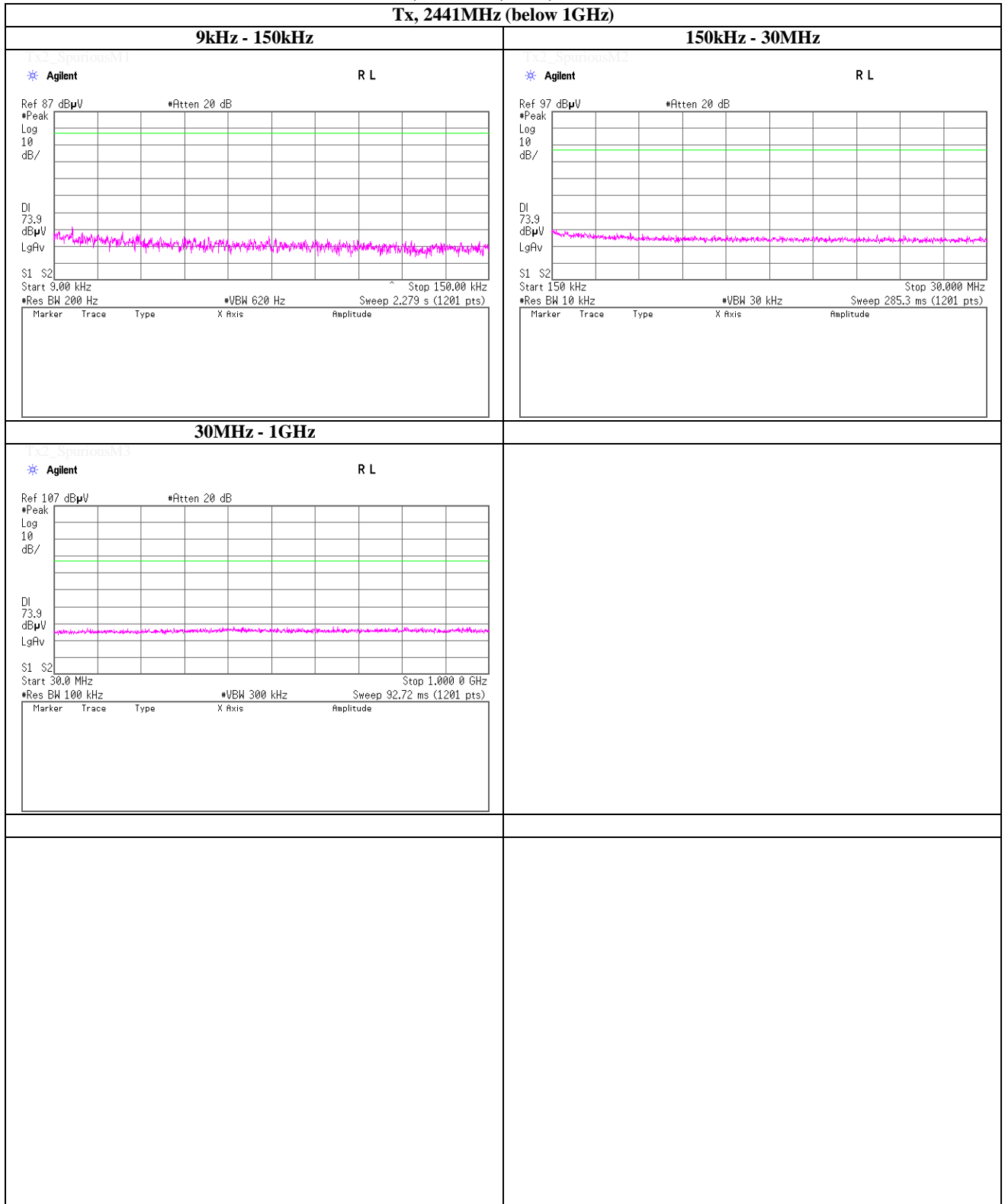
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (below 1GHz)



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

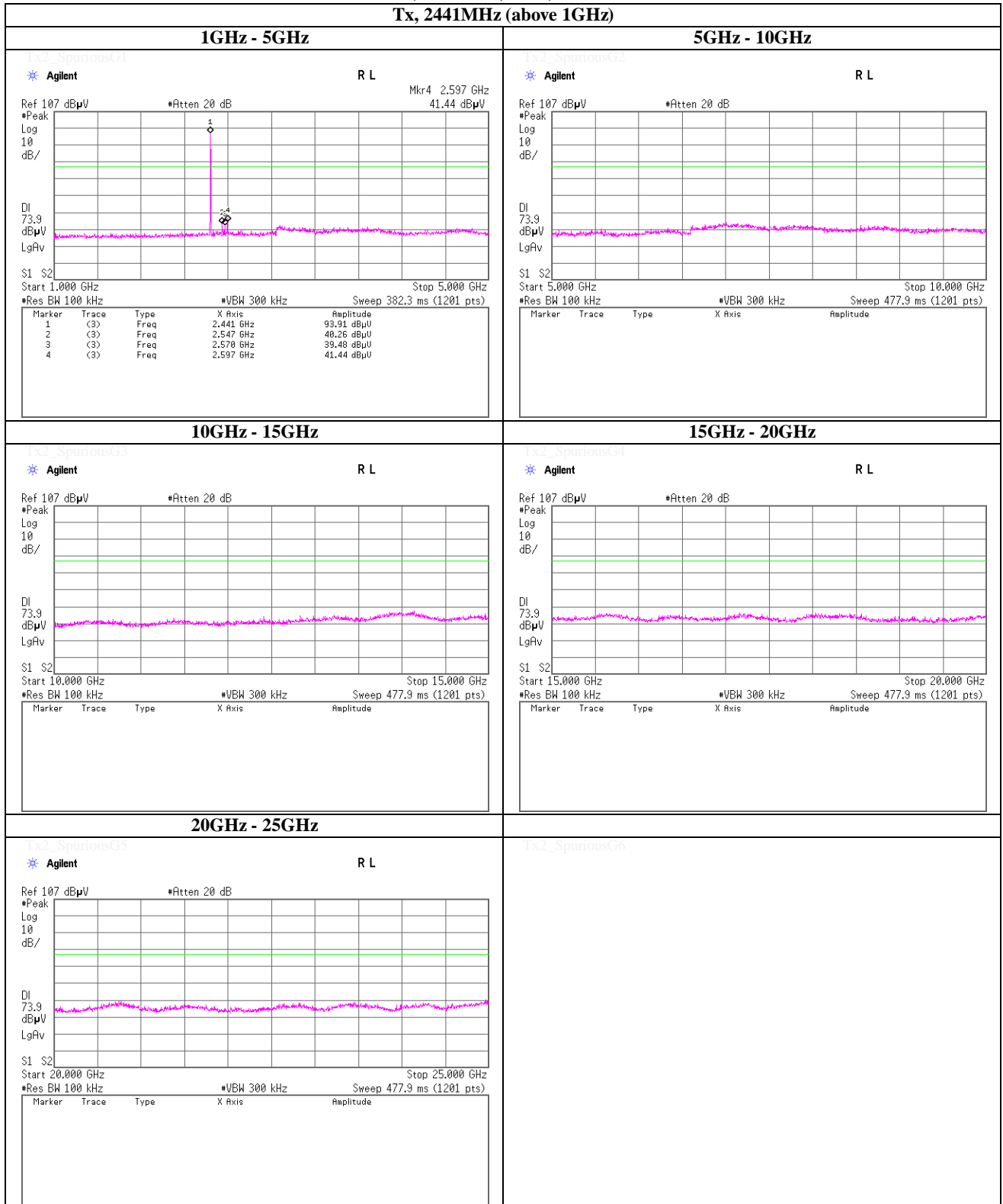
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

**Tx, Bluetooth, EDR, PRBS9**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

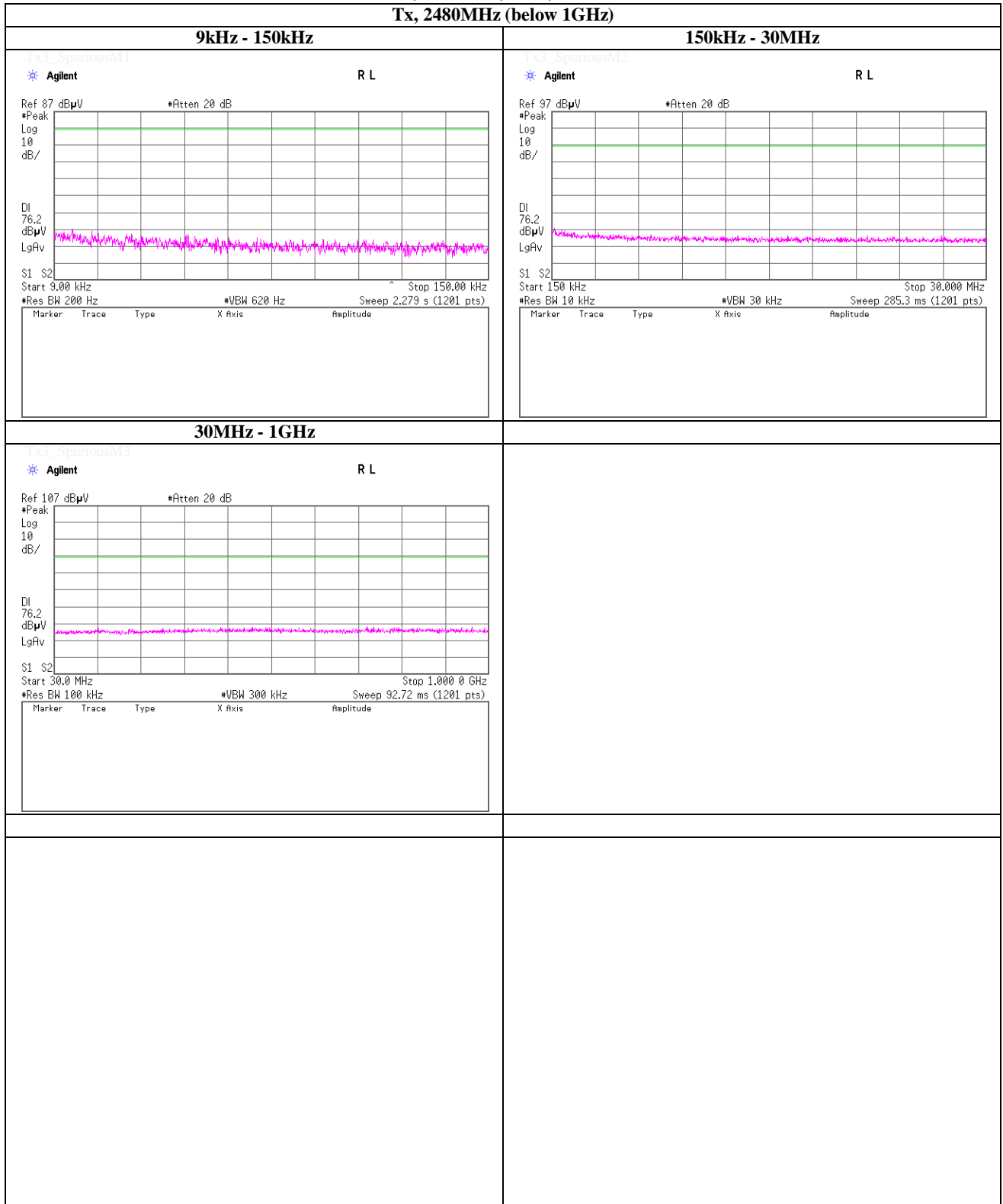
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 1GHz)



**UL Japan, Inc.**

**Shonan EMC Lab.**

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

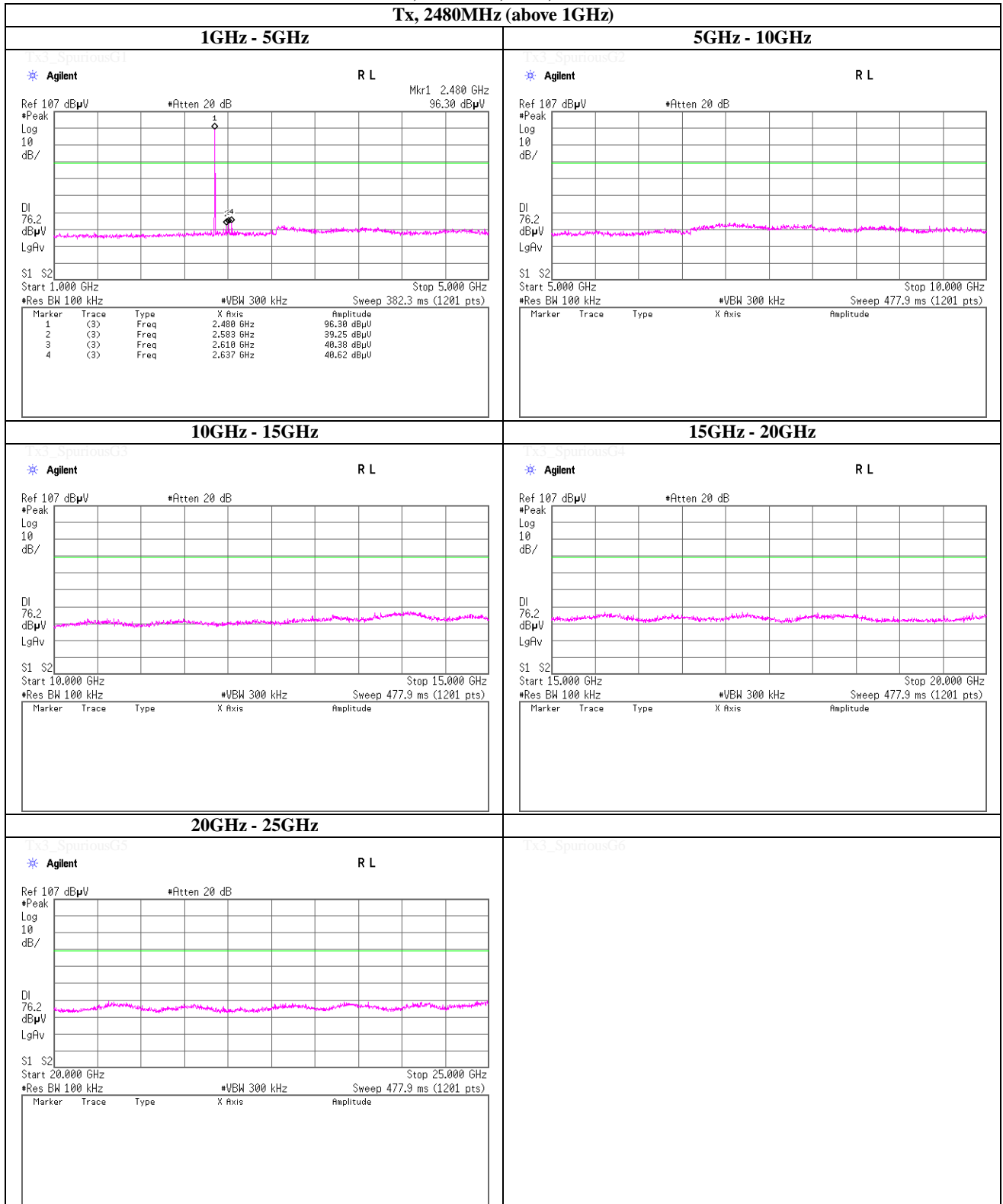
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### Spurious emission (Conducted)

**Tx, Bluetooth, EDR, PRBS9**

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



**UL Japan, Inc.**

**Shonan EMC Lab.**

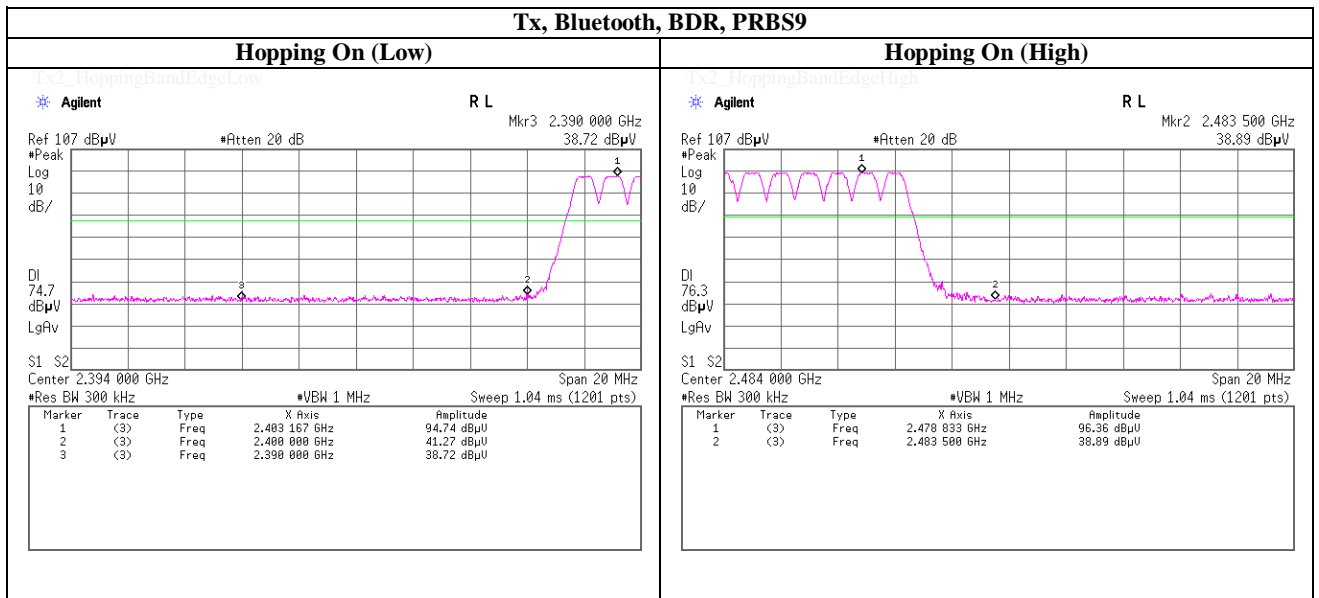
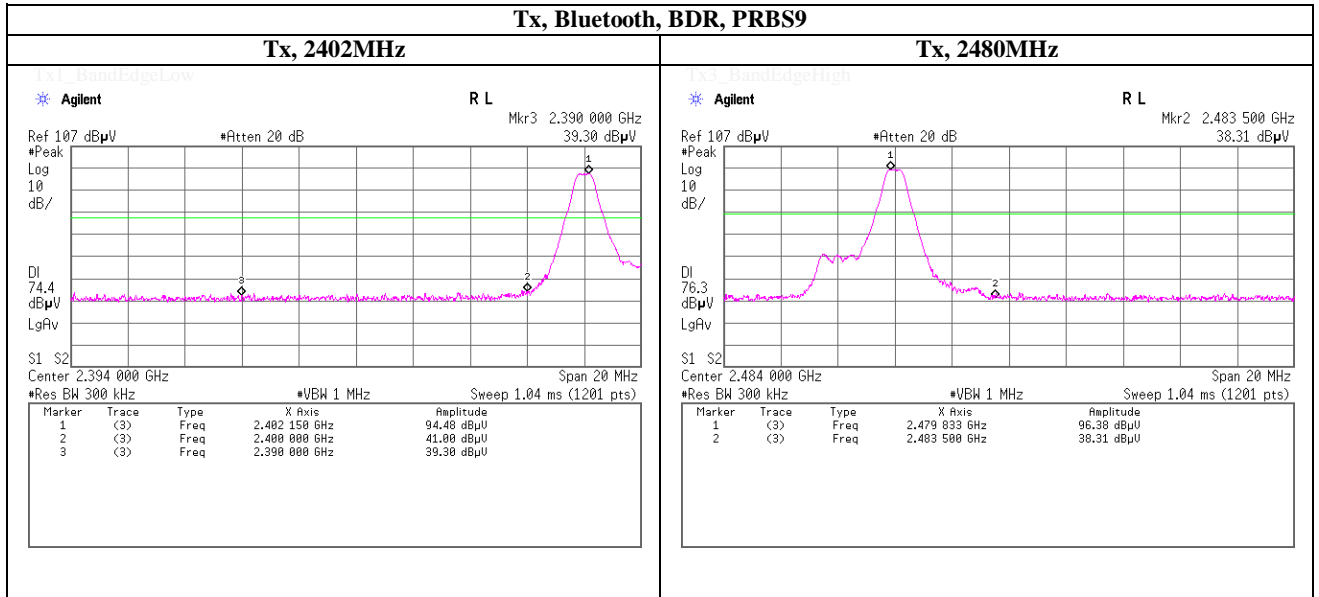
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Spurious emission (Conducted)

### Band Edge compliance



**UL Japan, Inc.**

**Shonan EMC Lab.**

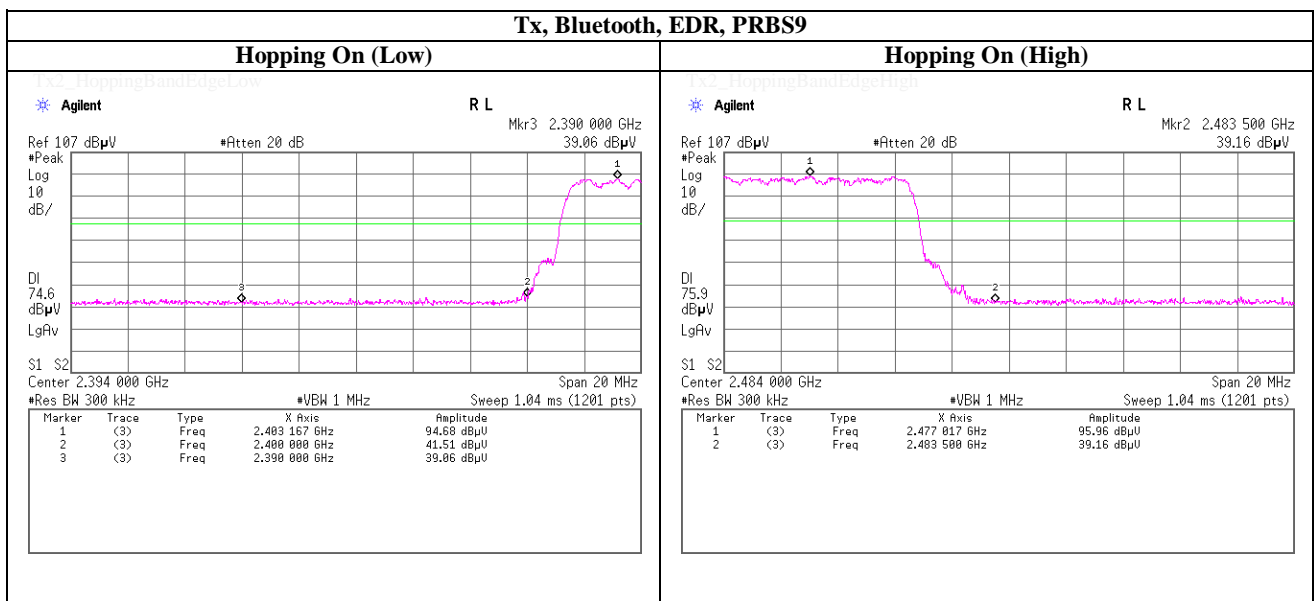
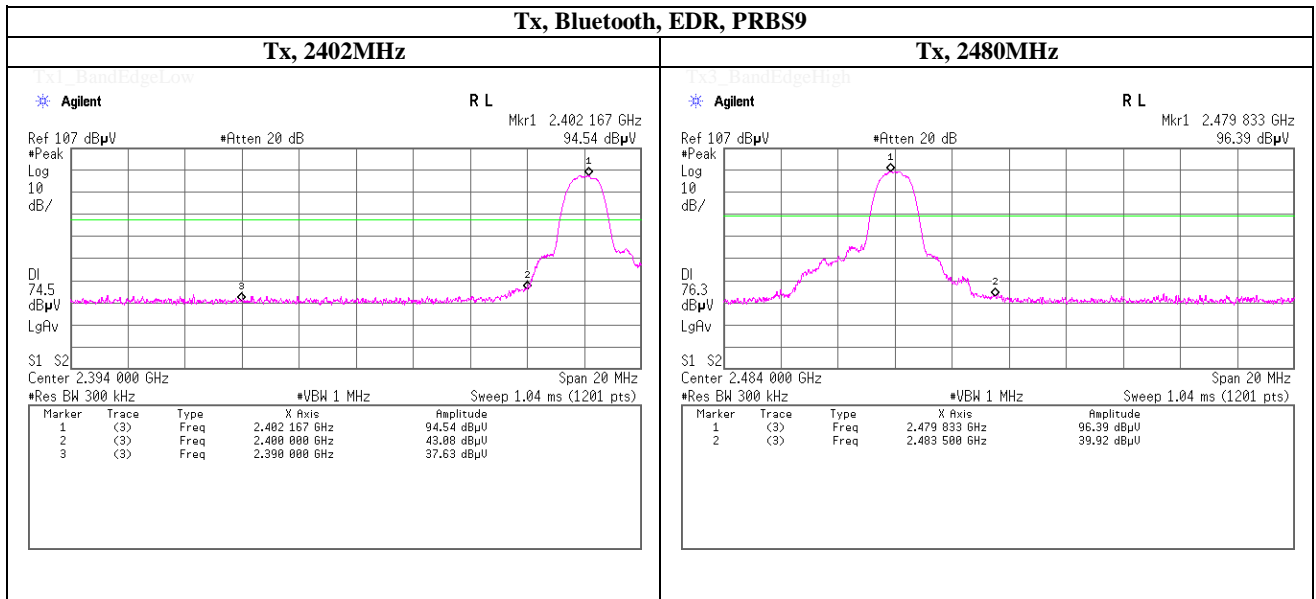
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Spurious emission (Conducted)

### Band Edge compliance



**UL Japan, Inc.**

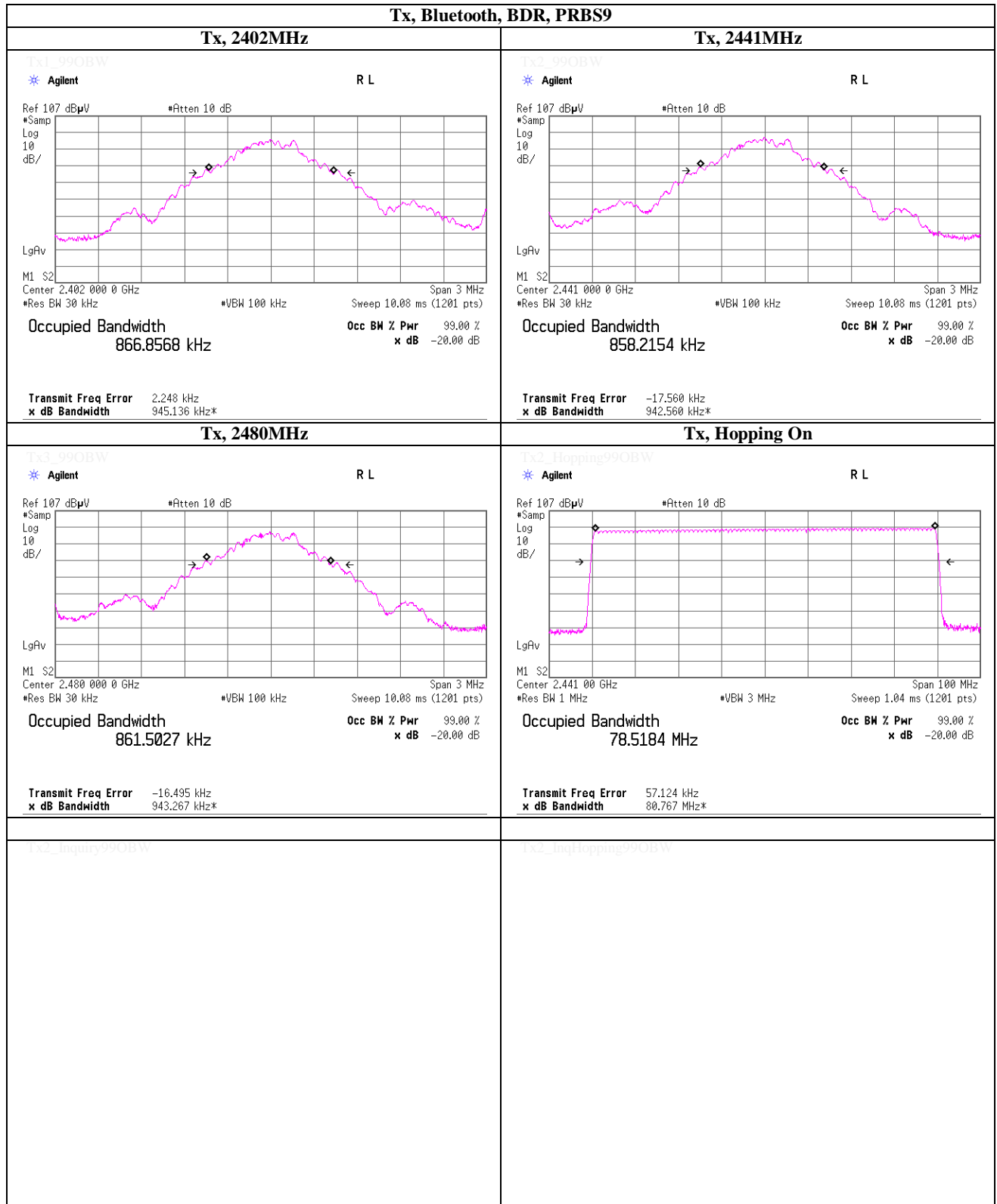
**Shonan EMC Lab.**

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### 99% Occupied Bandwidth



**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



### 99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
Tx, 2402MHz	Tx, 2441MHz
<p style="text-align: center;">Tx1_99OBW</p> <p style="text-align: center;">* Agilent R L</p> <p style="text-align: center;">Occupied Bandwidth 1.1553 MHz</p> <p style="text-align: center;">Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p style="text-align: center;">Transmit Freq Error -109.454 Hz x dB Bandwidth 1.258 MHz*</p>	<p style="text-align: center;">Tx1_99OBW</p> <p style="text-align: center;">* Agilent R L</p> <p style="text-align: center;">Occupied Bandwidth 1.1573 MHz</p> <p style="text-align: center;">Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p style="text-align: center;">Transmit Freq Error -11.647 kHz x dB Bandwidth 1.256 MHz*</p>
<p style="text-align: center;">Tx3_99OBW</p> <p style="text-align: center;">* Agilent R L</p> <p style="text-align: center;">Occupied Bandwidth 1.1567 MHz</p> <p style="text-align: center;">Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p style="text-align: center;">Transmit Freq Error -11.475 kHz x dB Bandwidth 1.257 MHz*</p>	<p style="text-align: center;">Tx2_Hopping99OBW</p> <p style="text-align: center;">* Agilent R L</p> <p style="text-align: center;">Occupied Bandwidth 78.6247 MHz</p> <p style="text-align: center;">Occ BW % Pwr 99.00 % x dB -20.00 dB</p> <p style="text-align: center;">Transmit Freq Error 62.009 kHz x dB Bandwidth 80.967 MHz*</p>
<p style="text-align: center;">Tx2_Inquiry99OBW</p>	<p style="text-align: center;">Tx2_InqHopping99OBW</p>

**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

## 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-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2011/12/05 * 12
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2012/04/06 * 12
SCC-G27	Coaxial Cable	Junkosha	MWX241-01000KM SKMS	SEP-20-12-00 1	AT	2012/09/26 * 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-11	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RF,IMF)	-	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
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2012/03/30 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2012/03/12 * 12
SCC-G18	Coaxial Cable	Suhner	SUCOFLEX 104A	46292/4A	RE	2012/03/12 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2012/02/10 * 12
SAT6-03	Attenuator	JFW	50HF-006N	-	RE	2012/02/10 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2012/10/08 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271 (RF Selector)	RE	2012/04/10 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2012/10/08 * 12
STR-03	Test Receiver	Rohde & Schwarz	ESI40	100054/040	RE	2012/06/14 * 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