

APPENDIX 2: Data of EMI test

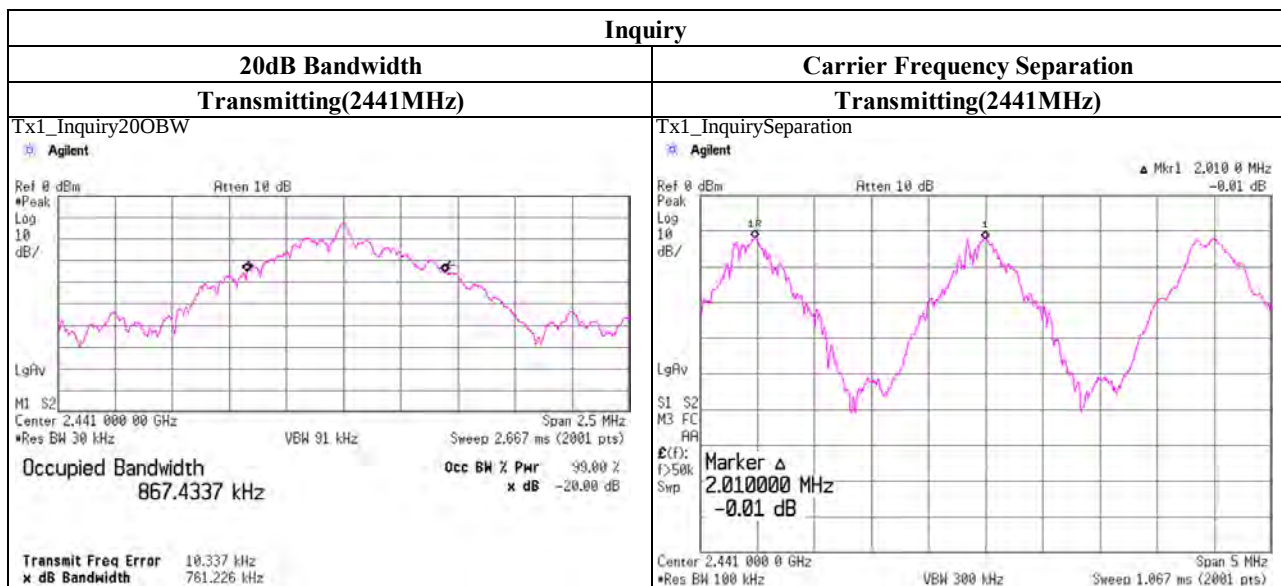
20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	July 20, 2011	
Temperature / Humidity	24deg.C , 56%RH	
Engineer	Kenichi Adachi	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.924	1.002	>= 0.616
DH5	2441.0	0.926	1.001	>= 0.617
DH5	2480.0	0.932	1.004	>= 0.621
Inquiry	2441.0	0.761	2.010	>= 0.507

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

No limit applies to 20dB Bandwidth.



UL Japan, Inc.

Shonan EMC Lab.

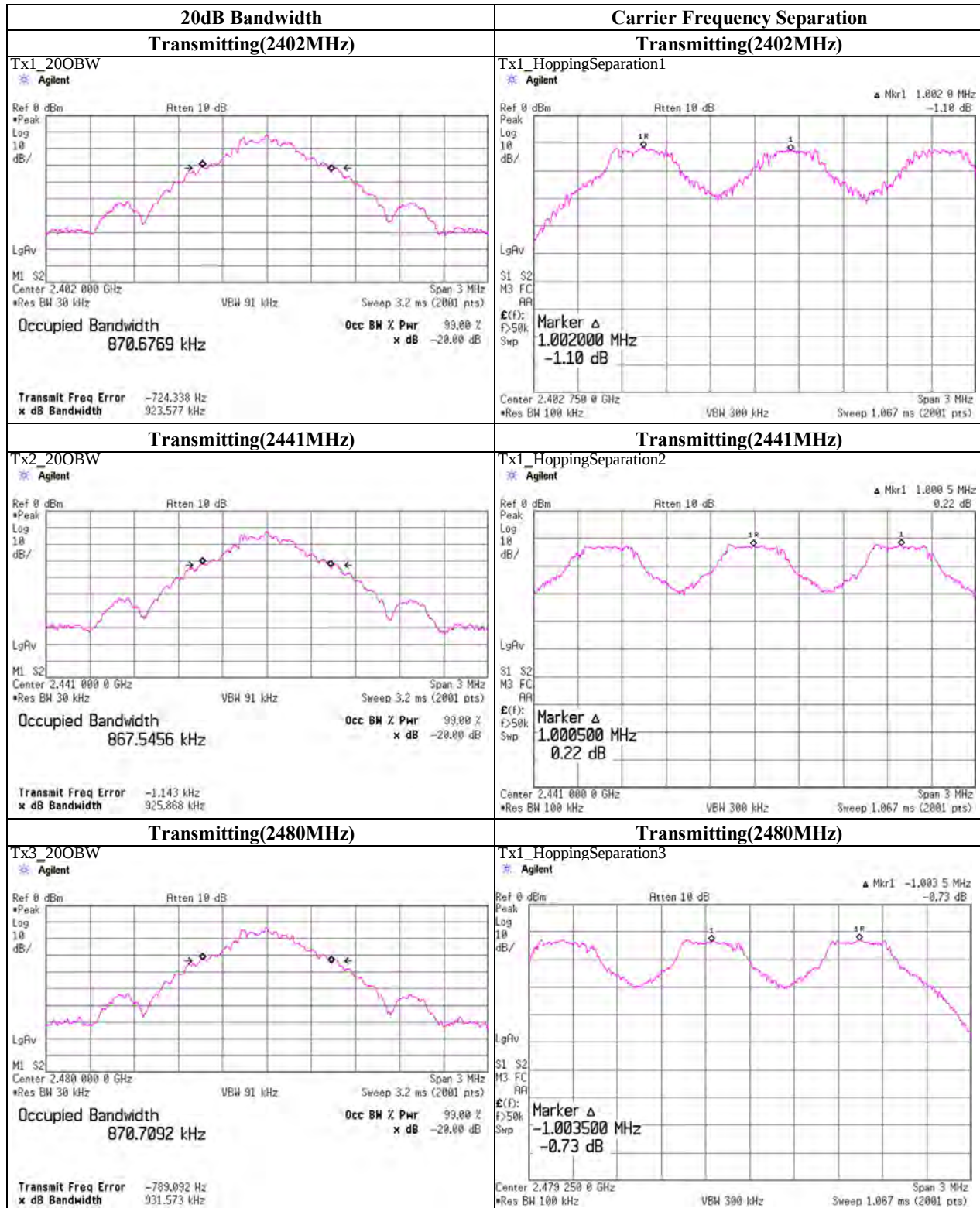
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR (Worst: DH5), PRBS9



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Shonan EMC Lab.

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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 July 20, 2011
Temperature / Humidity 24deg.C , 56%RH
Engineer Kenichi Adachi
Mode Tx, Bluetooth, EDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.269	1.004	>= 0.846
3-DH5	2441.0	1.275	1.002	>= 0.850
3-DH5	2480.0	1.277	1.004	>= 0.851

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

No limit applies to 20dB Bandwidth.

UL Japan, Inc.

Shonan EMC Lab.

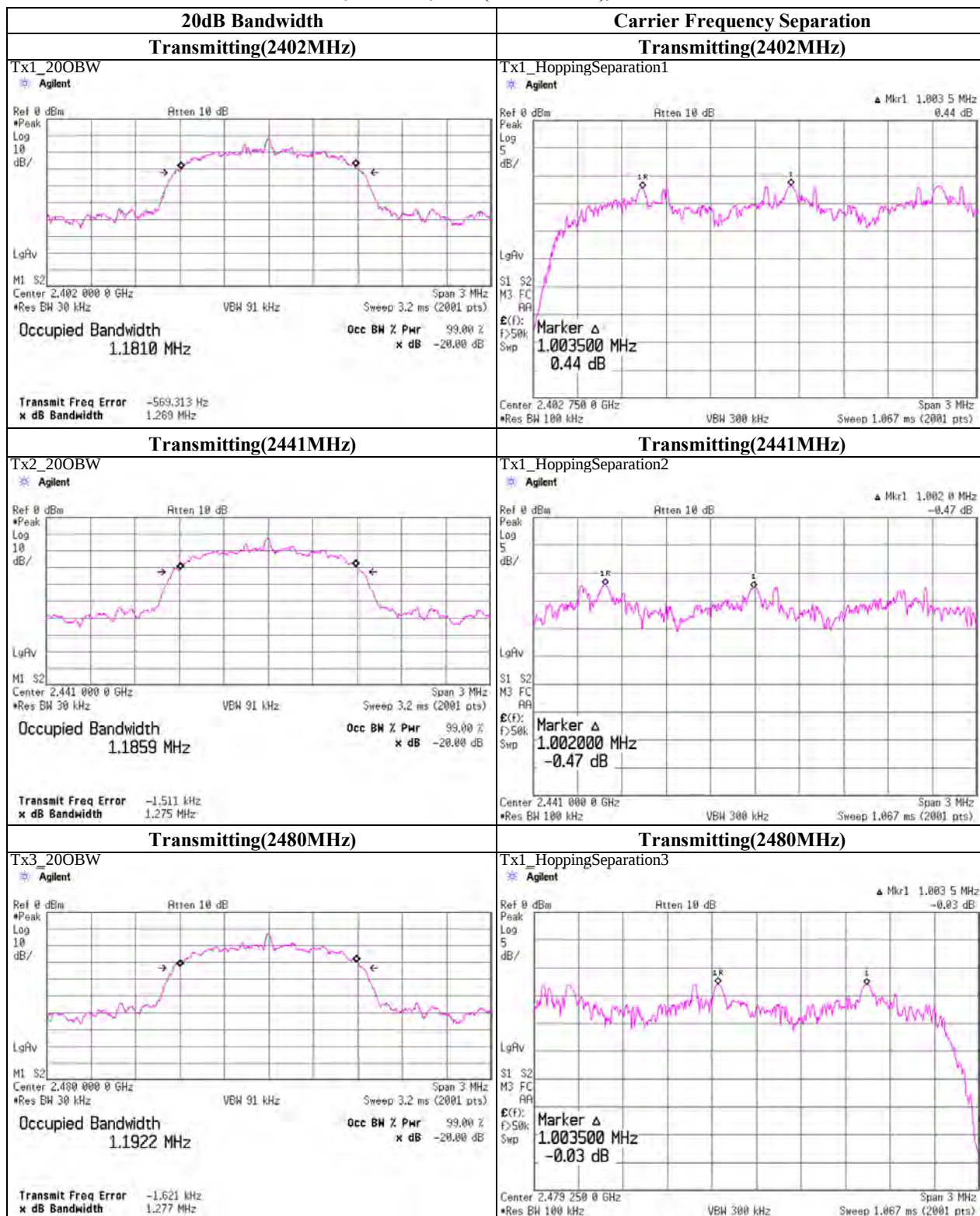
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR (Worst: 3-DH5), PRBS9



UL Japan, Inc.

Shonan EMC Lab.

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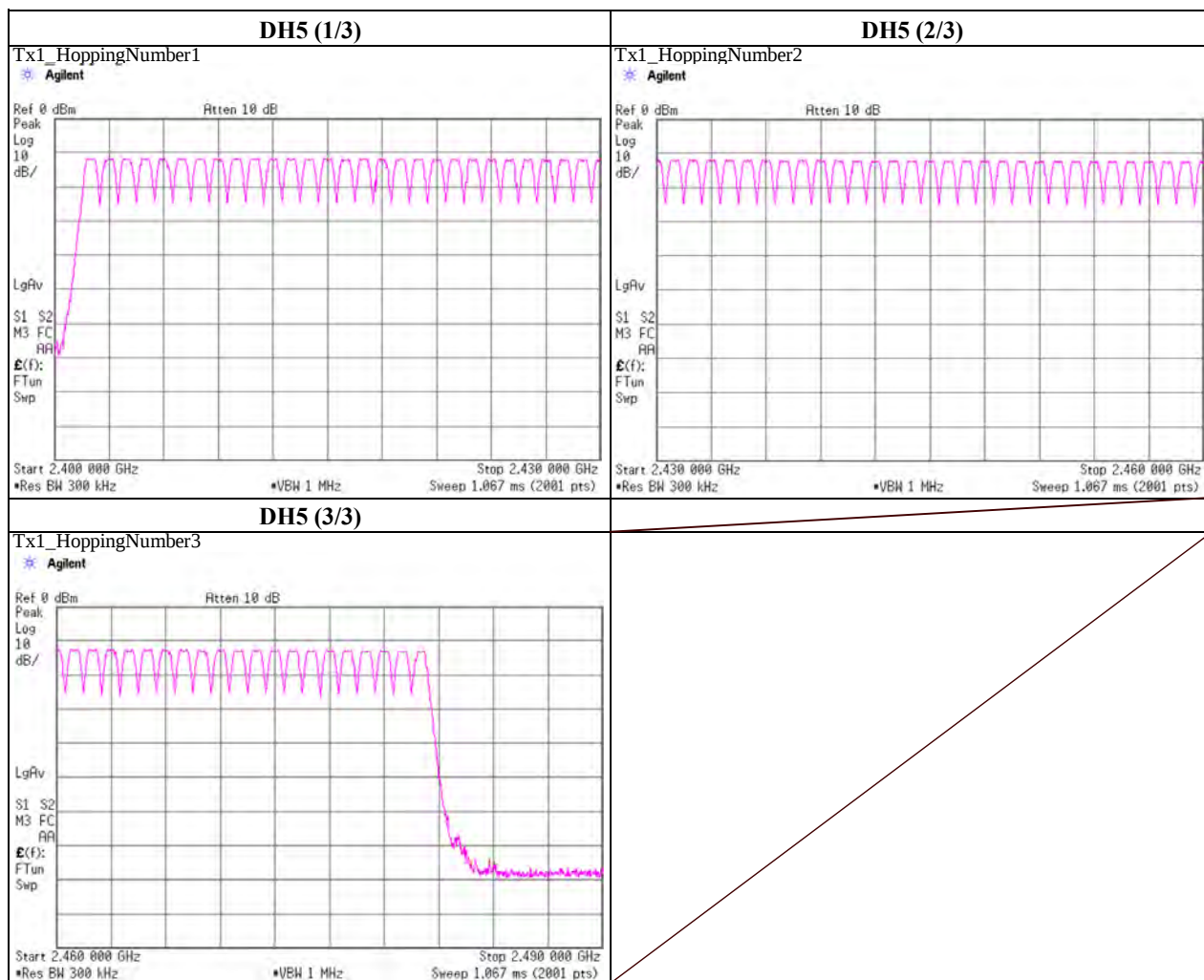
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Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.
Date	July 20, 2011
Temperature / Humidity	24deg.C , 56%RH
Engineer	Kenichi Adachi
Mode	Tx, Bluetooth, BDR, PRBS9

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



UL Japan, Inc.

Shonan EMC Lab.

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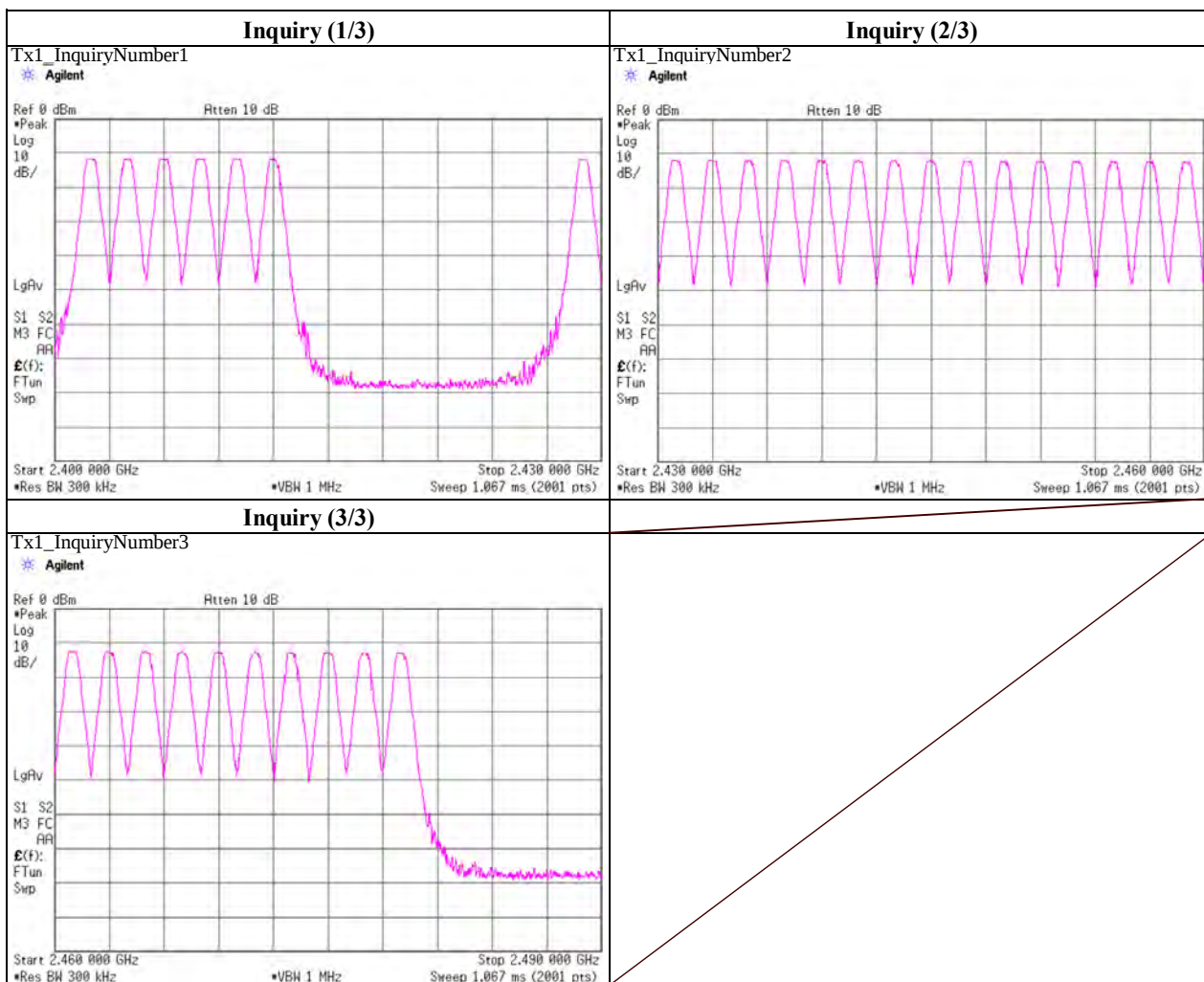
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.
Date	July 20, 2011
Temperature / Humidity	24deg.C , 56%RH
Engineer	Kenichi Adachi
Mode	Tx, Bluetooth, BDR, Inquiry

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



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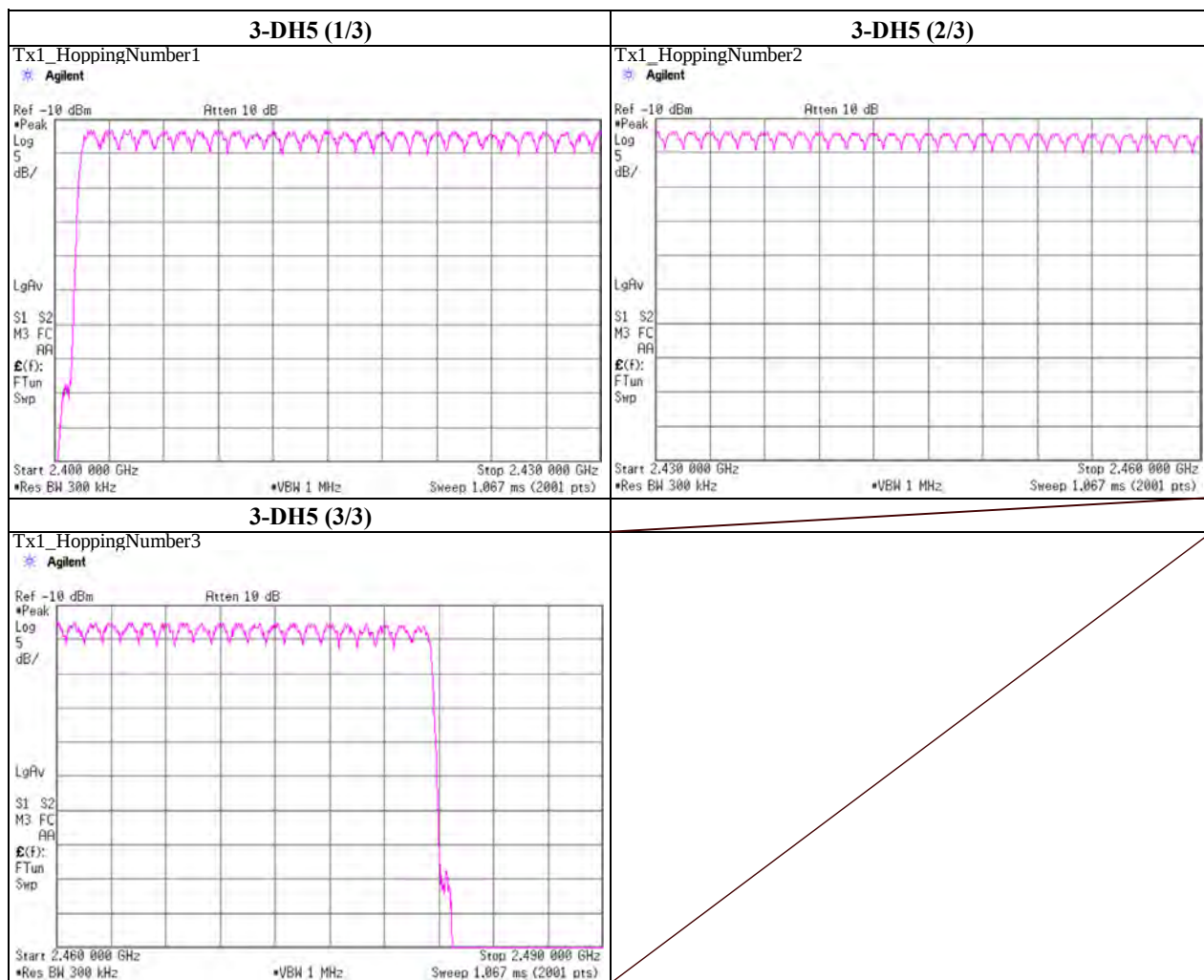
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.
Date	July 20, 2011
Temperature / Humidity	24deg.C , 56%RH
Engineer	Kenichi Adachi
Mode	Tx, Bluetooth, EDR, PRBS9

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



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date July 20, 2011
 Temperature / Humidity 24deg.C , 56%RH
 Engineer Kenichi Adachi
 Mode Tx, Bluetooth, BDR, PRBS9

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period			Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.2	/ 5.0 sec.	x 31.6 sec. = 318 times	0.486	154	400
DH3	25.8	/ 5.0 sec.	x 31.6 sec. = 164 times	1.740	285	400
DH5	19.4	/ 5.0 sec.	x 31.6 sec. = 123 times	2.997	369	400
Inquiry	100.0	/ 1.0 sec.	x 12.8 sec. = 1280 times	0.172	220	400

Sample Calculation

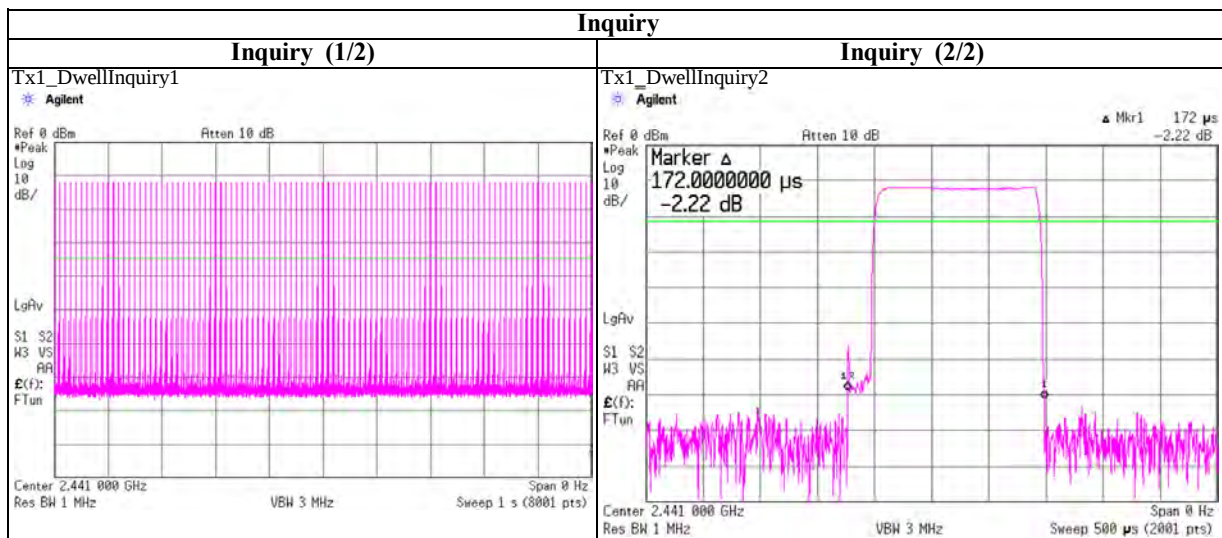
Result = Number of transmission x Length of transmission time

*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	48	51	52	49	51	50.2
DH3	21	29	23	28	28	25.8
DH5	23	18	18	22	16	19.4
Inquiry	100	100	100	100	100	100.0

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5



UL Japan, Inc.

Shonan EMC Lab.

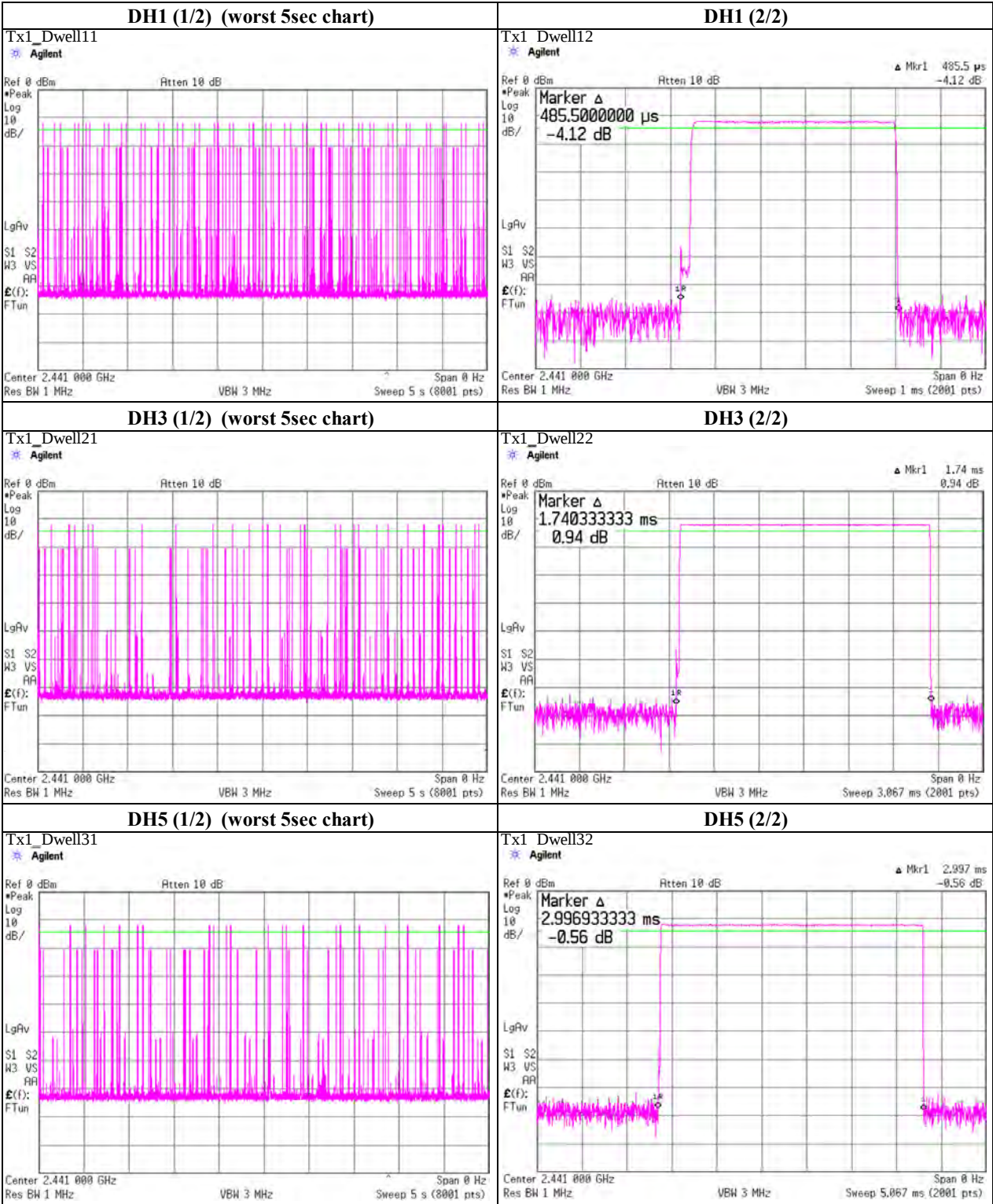
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Dwell time

Tx, Bluetooth, BDR, PRBS9



Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date July 20, 2011
 Temperature / Humidity 24deg.C , 56%RH
 Engineer Kenichi Adachi
 Mode Tx, Bluetooth, EDR, 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]
3-DH1	51.6	/ 5.0 sec.	x	31.6 sec.	= 327 times	0.481	157	400
3-DH3	27.8	/ 5.0 sec.	x	31.6 sec.	= 176 times	1.734	305	400
3-DH5	18.4	/ 5.0 sec.	x	31.6 sec.	= 117 times	2.989	350	400

Sample Calculation

Result = Number of transmission x Length of transmittion time

*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
3-DH1	51	52	52	52	51	51.6
3-DH3	26	31	27	27	28	27.8
3-DH5	19	20	16	18	19	18.4

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

UL Japan, Inc.

Shonan EMC Lab.

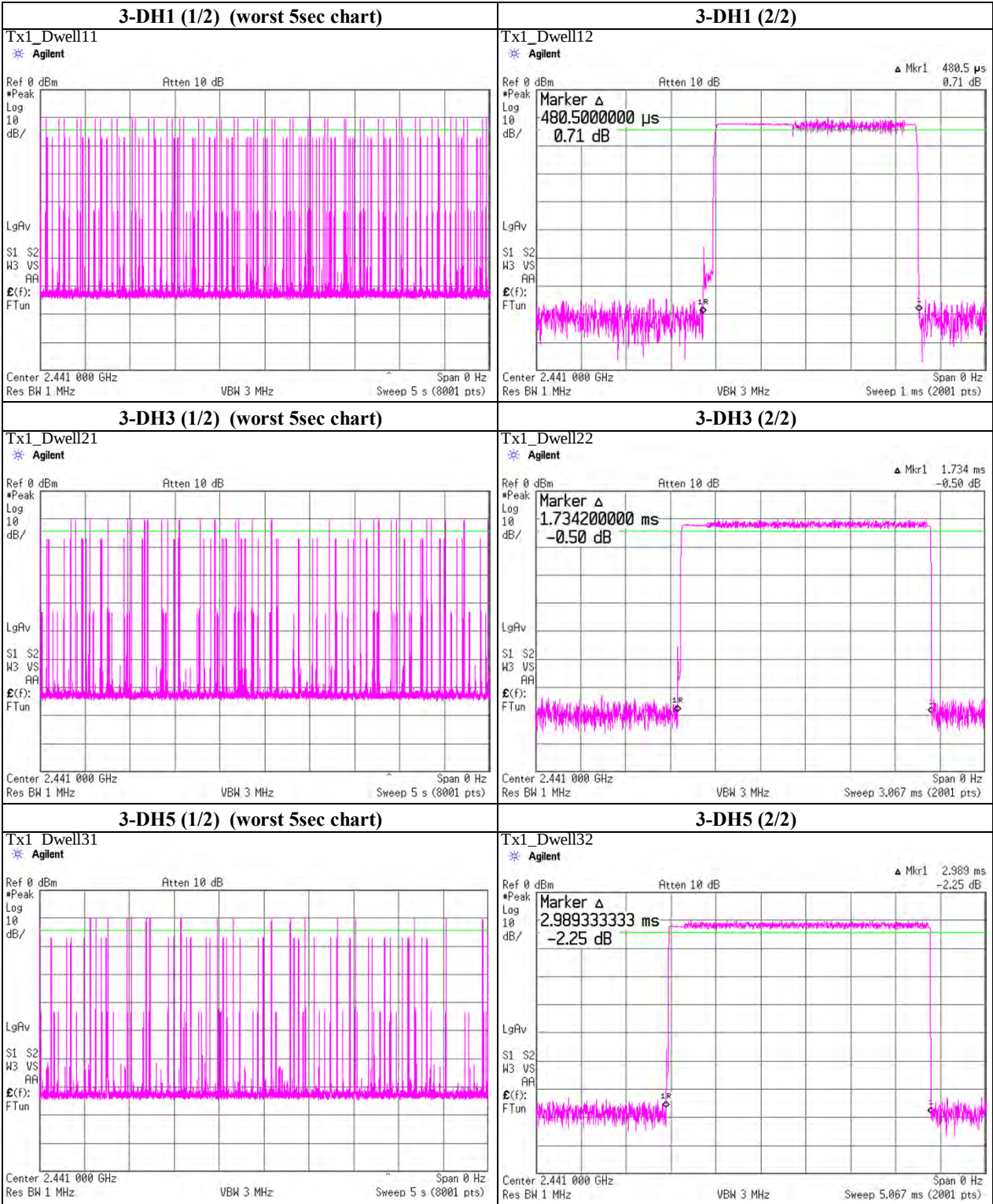
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone :+81 463 50 6400

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Dwell time

Tx, Bluetooth, EDR, PRBS9



Peak Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date July 20, 2011
Temperature / Humidity 24deg.C , 56%RH
Engineer Kenichi Adachi
Mode Tx, Bluetooth, BDR (Worst: DH5)
 Tx, Bluetooth, EDR (Worst: 3-DH5)

	Freq.	P/M (PK) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-11.42	1.38	9.57	-0.47	0.90	20.97	125	21.44
DH5	2441.0	-11.78	1.39	9.57	-0.82	0.83	20.97	125	21.79
DH5	2480.0	-12.58	1.40	9.57	-1.61	0.69	20.97	125	22.58
2-DH5	2402.0	-9.75	1.38	9.57	1.20	1.32	20.97	125	19.77
2-DH5	2441.0	-10.12	1.39	9.57	0.84	1.21	20.97	125	20.13
2-DH5	2480.0	-10.91	1.40	9.57	0.06	1.01	20.97	125	20.91
3-DH5	2402.0	-9.44	1.38	9.57	1.51	1.42	20.97	125	19.46
3-DH5	2441.0	-9.79	1.39	9.57	1.17	1.31	20.97	125	19.80
3-DH5	2480.0	-10.52	1.40	9.57	0.45	1.11	20.97	125	20.52

Sample Calculation:

Result = Reading + Cable Loss (supplied by customer) + Atten. Loss

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date July 22, 2011 July 25, 2011
Temperature / Humidity 22deg.C , 64%RH 25deg.C
Engineer Hikaru Shirasawa Shinichi Takano
Mode Tx, 2402 MHz
 Tx, Bluetooth, BDR, PRBS9

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	960.000	QP	37.4	21.3	10.9	30.5	39.1	46.0	6.9	150	67	
Hori.	1632.000	PK	50.0	25.6	13.1	40.9	47.8	73.9	26.1	109	222	
Hori.	2390.000	PK	46.7	27.5	13.8	41.1	46.9	73.9	27.0	100	0	
Hori.	2398.045	PK	45.9	27.5	13.8	41.1	46.1	73.9	27.8	100	359	
Hori.	2400.000	PK	47.7	27.5	13.8	41.1	47.9	73.9	26.0	100	214	
Hori.	4804.000	PK	46.9	31.5	6.0	41.1	43.3	73.9	30.6	100	0	
Hori.	7206.000	PK	48.8	36.4	7.4	41.3	51.3	73.9	22.6	100	359	
Hori.	9608.000	PK	46.4	37.9	8.7	38.8	54.2	73.9	19.7	100	0	
Hori.	12010.000	PK	47.7	39.4	10.2	39.2	58.1	73.9	15.8	100	359	
Hori.	1632.000	AV	44.3	25.6	13.1	40.9	42.1	53.9	11.8	109	222	
Hori.	2390.000	AV	32.7	27.5	13.8	41.1	32.9	53.9	21.0	100	0	
Hori.	2398.045	AV	33.1	27.5	13.8	41.1	33.3	53.9	20.6	100	359	
Hori.	2400.000	AV	38.5	27.5	13.8	41.1	38.7	53.9	15.2	100	214	VBW:270Hz
Hori.	4804.000	AV	35.0	31.5	6.0	41.1	31.4	53.9	22.5	100	0	VBW:270Hz
Hori.	7206.000	AV	36.6	36.4	7.4	41.3	39.1	53.9	14.8	100	359	VBW:270Hz
Hori.	9608.000	AV	33.7	37.9	8.7	38.8	41.5	53.9	12.4	100	0	VBW:270Hz
Hori.	12010.000	AV	35.2	39.4	10.2	39.2	45.6	53.9	8.3	100	359	VBW:270Hz
Vert.	35.721	QP	37.2	16.3	6.6	32.1	28.0	40.0	12.0	100	261	
Vert.	171.825	QP	40.3	15.5	7.8	32.0	31.6	43.5	11.9	100	311	
Vert.	480.009	QP	38.2	16.9	9.5	31.9	32.7	46.0	13.3	100	52	
Vert.	960.000	QP	35.9	21.3	10.9	30.5	37.6	46.0	8.4	115	122	
Vert.	1632.000	PK	48.4	25.6	13.1	40.9	46.2	73.9	27.7	100	232	
Vert.	2390.000	PK	45.1	27.5	13.8	41.1	45.3	73.9	28.6	100	0	
Vert.	2398.045	PK	45.7	27.5	13.8	41.1	45.9	73.9	28.0	100	0	
Vert.	2400.000	PK	47.8	27.5	13.8	41.1	48.0	73.9	25.9	100	216	
Vert.	4804.000	PK	46.7	31.5	6.0	41.1	43.1	73.9	30.8	100	0	
Vert.	7206.000	PK	48.5	36.4	7.4	41.3	51.0	73.9	22.9	100	359	
Vert.	9608.000	PK	45.5	37.9	8.7	38.8	53.3	73.9	20.6	100	0	
Vert.	12010.000	PK	47.7	39.4	10.2	39.2	58.1	73.9	15.8	100	359	
Vert.	1632.000	AV	42.6	25.6	13.1	40.9	40.4	53.9	13.5	100	232	
Vert.	2390.000	AV	32.6	27.5	13.8	41.1	32.8	53.9	21.1	100	0	
Vert.	2398.045	AV	32.6	27.5	13.8	41.1	32.8	53.9	21.1	100	0	
Vert.	2400.000	AV	37.3	27.5	13.8	41.1	37.5	53.9	16.4	100	216	VBW:270Hz
Vert.	4804.000	AV	35.0	31.5	6.0	41.1	31.4	53.9	22.5	100	0	VBW:270Hz
Vert.	7206.000	AV	36.7	36.4	7.4	41.3	39.2	53.9	14.7	100	359	VBW:270Hz
Vert.	9608.000	AV	33.8	37.9	8.7	38.8	41.6	53.9	12.3	100	0	VBW:270Hz
Vert.	12010.000	AV	35.2	39.4	10.2	39.2	45.6	53.9	8.3	100	359	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - 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: 13GHz-40GHz $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date July 22, 2011 July 25, 2011
 Temperature / Humidity 22deg.C , 64%RH 25deg.C
 Engineer Hikaru Shirasawa Shinichi Takano
 Mode Tx, 2441 MHz
 Tx, Bluetooth, BDR, PRBS9

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	960.000	QP	38.0	21.3	10.9	30.5	39.7	46.0	6.3	152	61	
Hori.	1632.000	PK	50.4	25.6	13.1	40.9	48.2	73.9	25.7	107	221	
Hori.	4882.000	PK	48.9	31.7	6.0	40.9	45.7	73.9	28.2	100	217	
Hori.	7323.000	PK	47.9	36.7	7.4	41.4	50.6	73.9	23.3	100	359	
Hori.	9764.000	PK	45.2	38.2	8.7	38.8	53.3	73.9	20.6	100	0	
Hori.	12205.000	PK	46.2	39.2	10.3	39.2	56.5	73.9	17.4	100	359	
Hori.	1632.000	AV	44.2	25.6	13.1	40.9	42.0	53.9	11.9	107	221	
Hori.	4882.000	AV	37.5	31.7	6.0	40.9	34.3	53.9	19.6	100	217	VBW:270Hz
Hori.	7323.000	AV	35.6	36.7	7.4	41.4	38.3	53.9	15.6	100	359	VBW:270Hz
Hori.	9764.000	AV	33.1	38.2	8.7	38.8	41.2	53.9	12.7	100	0	VBW:270Hz
Hori.	12205.000	AV	33.5	39.2	10.3	39.2	43.8	53.9	10.1	100	359	VBW:270Hz
Vert.	35.712	QP	36.8	16.3	6.6	32.1	27.6	40.0	12.4	100	259	
Vert.	171.825	QP	41.2	15.5	7.8	32.0	32.5	43.5	11.0	100	318	
Vert.	479.995	QP	39.4	16.9	9.5	31.9	33.9	46.0	12.1	100	57	
Vert.	960.000	QP	36.2	21.3	10.9	30.5	37.9	46.0	8.1	100	125	
Vert.	1632.000	PK	48.0	25.6	13.1	40.9	45.8	73.9	28.1	100	226	
Vert.	4882.000	PK	49.2	31.7	6.0	40.9	46.0	73.9	27.9	100	143	
Vert.	7323.000	PK	48.0	36.7	7.4	41.4	50.7	73.9	23.2	100	359	
Vert.	9764.000	PK	45.8	38.2	8.7	38.8	53.9	73.9	20.0	100	0	
Vert.	12205.000	PK	47.0	39.2	10.3	39.2	57.3	73.9	16.6	100	359	
Vert.	1632.000	AV	42.4	25.6	13.1	40.9	40.2	53.9	13.7	100	226	
Vert.	4882.000	AV	39.4	31.7	6.0	40.9	36.2	53.9	17.7	100	143	VBW:270Hz
Vert.	7323.000	AV	35.6	36.7	7.4	41.4	38.3	53.9	15.6	100	359	VBW:270Hz
Vert.	9764.000	AV	33.2	38.2	8.7	38.8	41.3	53.9	12.6	100	0	VBW:270Hz
Vert.	12205.000	AV	33.4	39.2	10.3	39.2	43.7	53.9	10.2	100	359	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - 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: 13GHz-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.3 Semi Anechoic Chamber
 Date July 22, 2011 July 25, 2011
 Temperature / Humidity 22deg.C , 64%RH 25deg.C
 Engineer Hikaru Shirasawa Shinichi Takano
 Mode Tx, 2480 MHz
 Tx, Bluetooth, BDR, PRBS9

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	960.000	QP	37.8	21.3	10.9	30.5	39.5	46.0	6.5	154.0	58	
Hori.	1632.000	PK	50.5	25.6	13.1	40.9	48.3	73.9	25.6	107.0	222	
Hori.	2483.500	PK	45.9	27.6	13.7	41.1	46.1	73.9	27.8	100.0	359	
Hori.	2484.180	PK	46.4	27.6	13.7	41.1	46.6	73.9	27.3	100.0	359	
Hori.	4960.000	PK	49.4	31.9	6.0	40.8	46.5	73.9	27.4	122.0	205	
Hori.	7440.000	PK	47.6	36.9	7.3	41.5	50.3	73.9	23.6	100.0	359	
Hori.	9920.000	PK	44.7	38.4	8.8	38.8	53.1	73.9	20.8	100.0	0	
Hori.	12400.000	PK	45.7	39.1	10.3	39.2	55.9	73.9	18.0	100.0	359	
Hori.	1632.000	AV	44.7	25.6	13.1	40.9	42.5	53.9	11.4	107.0	222	
Hori.	2483.500	AV	33.2	27.6	13.7	41.1	33.4	53.9	20.5	100.0	359	VBW:270Hz
Hori.	2484.180	AV	33.4	27.6	13.7	41.1	33.6	53.9	20.3	100.0	359	
Hori.	4960.000	AV	39.3	31.9	6.0	40.8	36.4	53.9	17.5	122.0	205	VBW:270Hz
Hori.	7440.000	AV	35.5	36.9	7.3	41.5	38.2	53.9	15.7	100.0	359	VBW:270Hz
Hori.	9920.000	AV	33.1	38.4	8.8	38.8	41.5	53.9	12.4	100.0	0	VBW:270Hz
Hori.	12400.000	AV	32.5	39.1	10.3	39.2	42.7	53.9	11.2	100.0	359	VBW:270Hz
Vert.	35.720	QP	37.5	16.3	6.6	32.1	28.3	40.0	11.7	100.0	241	
Vert.	171.828	QP	40.9	15.5	7.8	32.0	32.2	43.5	11.3	100.0	322	
Vert.	480.004	QP	40.3	16.9	9.5	31.9	34.8	46.0	11.2	100.0	57	
Vert.	960.000	QP	35.9	21.3	10.9	30.5	37.6	46.0	8.4	100.0	127	
Vert.	1632.000	PK	49.6	25.6	13.1	40.9	47.4	73.9	26.5	100.0	226	
Vert.	2483.500	PK	45.7	27.6	13.7	41.1	45.9	73.9	28.0	100.0	359	
Vert.	2484.180	PK	46.2	27.6	13.7	41.1	46.4	73.9	27.5	100.0	359	
Vert.	4960.000	PK	50.8	31.9	6.0	40.8	47.9	73.9	26.0	100.0	231	
Vert.	7440.000	PK	48.0	36.9	7.3	41.5	50.7	73.9	23.2	100.0	359	
Vert.	9920.000	PK	44.9	38.4	8.8	38.8	53.3	73.9	20.6	100.0	0	
Vert.	12400.000	PK	45.1	39.1	10.3	39.2	55.3	73.9	18.6	100.0	359	
Vert.	1632.000	AV	42.1	25.6	13.1	40.9	39.9	53.9	14.0	100.0	226	
Vert.	2483.500	AV	33.1	27.6	13.7	41.1	33.3	53.9	20.6	100.0	359	VBW:270Hz
Vert.	2484.180	AV	33.3	27.6	13.7	41.1	33.5	53.9	20.4	100.0	359	
Vert.	4960.000	AV	43.0	31.9	6.0	40.8	40.1	53.9	13.8	100.0	231	VBW:270Hz
Vert.	7440.000	AV	35.4	36.9	7.3	41.5	38.1	53.9	15.8	100.0	359	VBW:270Hz
Vert.	9920.000	AV	32.0	38.4	8.8	38.8	40.4	53.9	13.5	100.0	0	VBW:270Hz
Vert.	12400.000	AV	32.4	39.1	10.3	39.2	42.6	53.9	11.3	100.0	359	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - 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: 13GHz-40GHz $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date July 22, 2011 July 25, 2011
 Temperature / Humidity 22deg.C , 64%RH 25deg.C
 Engineer Hikaru Shirasawa Shinichi Takano
 Mode Tx, 2402 MHz
 Tx, Bluetooth, EDR, PRBS9

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	960.000	QP	38.0	21.3	10.9	30.5	39.7	46.0	6.3	100	63	
Hori.	1632.000	PK	50.3	25.6	13.1	40.9	48.1	73.9	25.8	109	222	
Hori.	2390.000	PK	46.0	27.5	13.8	41.1	46.2	73.9	27.7	100	0	
Hori.	2397.820	PK	45.1	27.5	13.8	41.1	45.3	73.9	28.6	100	359	
Hori.	2400.000	PK	55.9	27.5	13.8	41.1	56.1	73.9	17.8	118	352	
Hori.	4804.000	PK	49.0	31.5	6.0	41.1	45.4	73.9	28.5	136	236	
Hori.	7206.000	PK	48.6	36.4	7.4	41.3	51.1	73.9	22.8	100	359	
Hori.	9608.000	PK	46.4	37.9	8.7	38.8	54.2	73.9	19.7	100	0	
Hori.	12010.000	PK	48.1	39.4	10.2	39.2	58.5	73.9	15.4	100	359	
Hori.	1632.000	AV	44.5	25.6	13.1	40.9	42.3	53.9	11.6	109	222	
Hori.	2390.000	AV	33.2	27.5	13.8	41.1	33.4	53.9	20.5	100	0	
Hori.	2397.820	AV	33.4	27.5	13.8	41.1	33.6	53.9	20.3	100	359	
Hori.	2400.000	AV	42.8	27.5	13.8	41.1	43.0	53.9	10.9	118	352	VBW:270Hz
Hori.	4804.000	AV	38.6	31.5	6.0	41.1	35.0	53.9	18.9	136	236	VBW:270Hz
Hori.	7206.000	AV	36.1	36.4	7.4	41.3	38.6	53.9	15.3	100	359	VBW:270Hz
Hori.	9608.000	AV	33.7	37.9	8.7	38.8	41.5	53.9	12.4	100	0	VBW:270Hz
Hori.	12010.000	AV	35.2	39.4	10.2	39.2	45.6	53.9	8.3	100	359	VBW:270Hz
Vert.	35.718	QP	36.9	16.3	6.6	32.1	27.7	40.0	12.3	100	248	
Vert.	171.829	QP	40.5	15.5	7.8	32.0	31.8	43.5	11.7	100	318	
Vert.	479.995	QP	40.0	16.9	9.5	31.9	34.5	46.0	11.5	100	48	
Vert.	960.000	QP	35.9	21.3	10.9	30.5	37.6	46.0	8.4	100	121	
Vert.	1632.000	PK	49.7	25.6	13.1	40.9	47.5	73.9	26.4	132	232	
Vert.	2390.000	PK	45.9	27.5	13.8	41.1	46.1	73.9	27.8	100	0	
Vert.	2397.820	PK	45.6	27.5	13.8	41.1	45.8	73.9	28.1	100	0	
Vert.	2400.000	PK	51.8	27.5	13.8	41.1	52.0	73.9	21.9	100	77	
Vert.	4804.000	PK	50.0	31.5	6.0	41.1	46.4	73.9	27.5	100	143	
Vert.	7206.000	PK	48.0	36.4	7.4	41.3	50.5	73.9	23.4	100	359	
Vert.	9608.000	PK	46.4	37.9	8.7	38.8	54.2	73.9	19.7	100	0	
Vert.	12010.000	PK	47.8	39.4	10.2	39.2	58.2	73.9	15.7	100	359	
Vert.	1632.000	AV	41.7	25.6	13.1	40.9	39.5	53.9	14.4	132	232	
Vert.	2390.000	AV	32.8	27.5	13.8	41.1	33.0	53.9	20.9	100	0	
Vert.	2397.820	AV	33.3	27.5	13.8	41.1	33.5	53.9	20.4	100	0	
Vert.	2400.000	AV	38.9	27.5	13.8	41.1	39.1	53.9	14.8	100	77	VBW:270Hz
Vert.	4804.000	AV	41.5	31.5	6.0	41.1	37.9	53.9	16.0	100	143	VBW:270Hz
Vert.	7206.000	AV	36.1	36.4	7.4	41.3	38.6	53.9	15.3	100	359	VBW:270Hz
Vert.	9608.000	AV	33.6	37.9	8.7	38.8	41.4	53.9	12.5	100	0	VBW:270Hz
Vert.	12010.000	AV	35.3	39.4	10.2	39.2	45.7	53.9	8.2	100	359	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - 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: 13GHz-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.3 Semi Anechoic Chamber
 Date July 22, 2011 July 25, 2011
 Temperature / Humidity 22deg.C , 64%RH 25deg.C
 Engineer Hikaru Shirasawa Shinichi Takano
 Mode Tx, 2441 MHz
 Tx, Bluetooth, EDR, PRBS9

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	960.000	QP	38.2	21.3	10.9	30.5	39.9	46.0	6.1	150	65	
Hori.	1632.000	PK	50.1	25.6	13.1	40.9	47.9	73.9	26.0	109	224	
Hori.	4882.000	PK	50.0	31.7	6.0	40.9	46.8	73.9	27.1	109	227	
Hori.	7323.000	PK	48.6	36.7	7.4	41.4	51.3	73.9	22.6	100	359	
Hori.	9764.000	PK	46.1	38.2	8.7	38.8	54.2	73.9	19.7	100	0	
Hori.	12205.000	PK	46.4	39.2	10.3	39.2	56.7	73.9	17.2	100	359	
Hori.	1632.000	AV	42.6	25.6	13.1	40.9	40.4	53.9	13.5	109	224	
Hori.	4882.000	AV	42.2	31.7	6.0	40.9	39.0	53.9	14.9	109	227	VBW:270Hz
Hori.	7323.000	AV	35.8	36.7	7.4	41.4	38.5	53.9	15.4	100	359	VBW:270Hz
Hori.	9764.000	AV	33.4	38.2	8.7	38.8	41.5	53.9	12.4	100	0	VBW:270Hz
Hori.	12205.000	AV	33.9	39.2	10.3	39.2	44.2	53.9	9.7	100	359	VBW:270Hz
Vert.	35.718	QP	36.7	16.3	6.6	32.1	27.5	40.0	12.5	100	241	
Vert.	171.828	QP	40.8	15.5	7.8	32.0	32.1	43.5	11.4	100	320	
Vert.	480.004	QP	39.7	16.9	9.5	31.9	34.2	46.0	11.8	100	49	
Vert.	960.000	QP	36.1	21.3	10.9	30.5	37.8	46.0	8.2	100	123	
Vert.	1632.000	PK	49.5	25.6	13.1	40.9	47.3	73.9	26.6	100	224	
Vert.	4882.000	PK	49.0	31.7	6.0	40.9	45.8	73.9	28.1	100	221	
Vert.	7323.000	PK	48.3	36.7	7.4	41.4	51.0	73.9	22.9	100	359	
Vert.	9764.000	PK	45.7	38.2	8.7	38.8	53.8	73.9	20.1	100	0	
Vert.	12205.000	PK	46.7	39.2	10.3	39.2	57.0	73.9	16.9	100	359	
Vert.	1632.000	AV	41.5	25.6	13.1	40.9	39.3	53.9	14.6	100	224	
Vert.	4882.000	AV	40.4	31.7	6.0	40.9	37.2	53.9	16.7	100	221	VBW:270Hz
Vert.	7323.000	AV	35.7	36.7	7.4	41.4	38.4	53.9	15.5	100	359	VBW:270Hz
Vert.	9764.000	AV	32.9	38.2	8.7	38.8	41.0	53.9	12.9	100	0	VBW:270Hz
Vert.	12205.000	AV	33.6	39.2	10.3	39.2	43.9	53.9	10.0	100	359	VBW:270Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 13GHz)) - 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: 13GHz-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.3 Semi Anechoic Chamber
 Date July 22, 2011 July 25, 2011
 Temperature / Humidity 22deg.C , 64%RH 25deg.C
 Engineer Hikaru Shirasawa Shinichi Takano
 Mode Tx, 2480 MHz
 Tx, Bluetooth, EDR, PRBS9

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	960.000	QP	38.1	21.3	10.9	30.5	39.8	46.0	6.2	100	61	
Hori.	1632.000	PK	50.3	25.6	13.1	40.9	48.1	73.9	25.8	105	220	
Hori.	2483.500	PK	45.9	27.6	13.7	41.1	46.1	73.9	27.8	100	359	
Hori.	2484.300	PK	45.6	27.6	13.7	41.1	45.8	73.9	28.1	100	359	
Hori.	4960.000	PK	49.0	31.9	6.0	40.8	46.1	73.9	27.8	100	189	
Hori.	7440.000	PK	48.0	36.9	7.3	41.5	50.7	73.9	23.2	100	359	
Hori.	9920.000	PK	44.1	38.4	8.8	38.8	52.5	73.9	21.4	100	0	
Hori.	12400.000	PK	44.8	39.1	10.3	39.2	55.0	73.9	18.9	100	359	
Hori.	1632.000	AV	44.1	25.6	13.1	40.9	41.9	53.9	12.0	105	220	
Hori.	2483.500	AV	33.2	27.6	13.7	41.1	33.4	53.9	20.5	100	359	VBW:270Hz
Hori.	2484.300	AV	32.8	27.6	13.7	41.1	33.0	53.9	20.9	100	359	
Hori.	4960.000	AV	39.8	31.9	6.0	40.8	36.9	53.9	17.0	100	189	VBW:270Hz
Hori.	7440.000	AV	35.5	36.9	7.3	41.5	38.2	53.9	15.7	100	359	VBW:270Hz
Hori.	9920.000	AV	32.0	38.4	8.8	38.8	40.4	53.9	13.5	100	0	VBW:270Hz
Hori.	12400.000	AV	32.2	39.1	10.3	39.2	42.4	53.9	11.5	100	359	VBW:270Hz
Vert.	35.716	QP	37.0	16.3	6.6	32.1	27.8	40.0	12.2	100	246	
Vert.	171.826	QP	40.8	15.5	7.8	32.0	32.1	43.5	11.4	100	315	
Vert.	479.999	QP	40.9	16.9	9.5	31.9	35.4	46.0	10.6	100	55	
Vert.	960.000	QP	35.9	21.3	10.9	30.5	37.6	46.0	8.4	100	129	
Vert.	1632.000	PK	49.2	25.6	13.1	40.9	47.0	73.9	26.9	100	232	
Vert.	2483.500	PK	45.7	27.6	13.7	41.1	45.9	73.9	28.0	100	359	
Vert.	2484.300	PK	46.0	27.6	13.7	41.1	46.2	73.9	27.7	100	359	
Vert.	4960.000	PK	48.6	31.9	6.0	40.8	45.7	73.9	28.2	100	233	
Vert.	7440.000	PK	48.3	36.9	7.3	41.5	51.0	73.9	22.9	100	359	
Vert.	9920.000	PK	45.5	38.4	8.8	38.8	53.9	73.9	20.0	100	0	
Vert.	12400.000	PK	44.7	39.1	10.3	39.2	54.9	73.9	19.0	100	359	
Vert.	1632.000	AV	41.2	25.6	13.1	40.9	39.0	53.9	14.9	100	232	
Vert.	2483.500	AV	33.8	27.6	13.7	41.1	34.0	53.9	19.9	100	359	VBW:270Hz
Vert.	2484.300	AV	33.1	27.6	13.7	41.1	33.3	53.9	20.6	100	359	
Vert.	4960.000	AV	38.3	31.9	6.0	40.8	35.4	53.9	18.5	100	233	VBW:270Hz
Vert.	7440.000	AV	35.6	36.9	7.3	41.5	38.3	53.9	15.6	100	359	VBW:270Hz
Vert.	9920.000	AV	32.2	38.4	8.8	38.8	40.6	53.9	13.3	100	0	VBW:270Hz
Vert.	12400.000	AV	32.4	39.1	10.3	39.2	42.6	53.9	11.3	100	359	VBW:270Hz

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

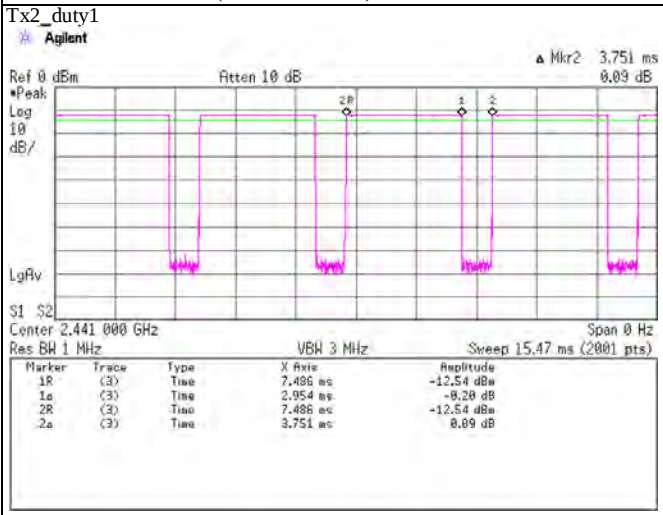
Distance factor: 13GHz-40GHz $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

Spurious emission (Radiated)

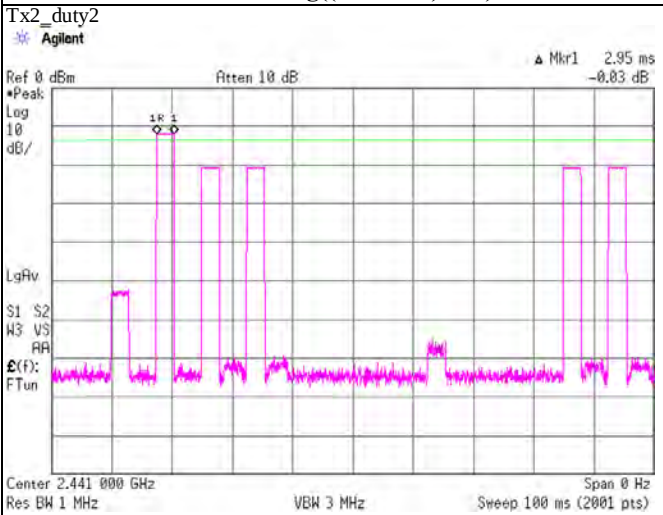
Tx, Bluetooth, BDR, PRBS9

VBW (AV) Calculation

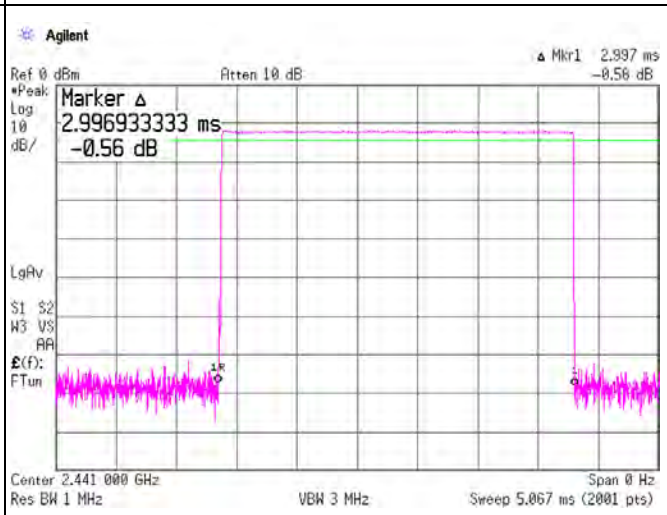
VBW: $1/x = 266.6\text{Hz} < 270\text{Hz}$
x: (Tx on+Tx off) = 3.751ms



Worst 100ms
Dwell time factor = $20\log((2.997 \times 2)/100) = -24.45\text{dB}$



1cycle On time : 2.997ms



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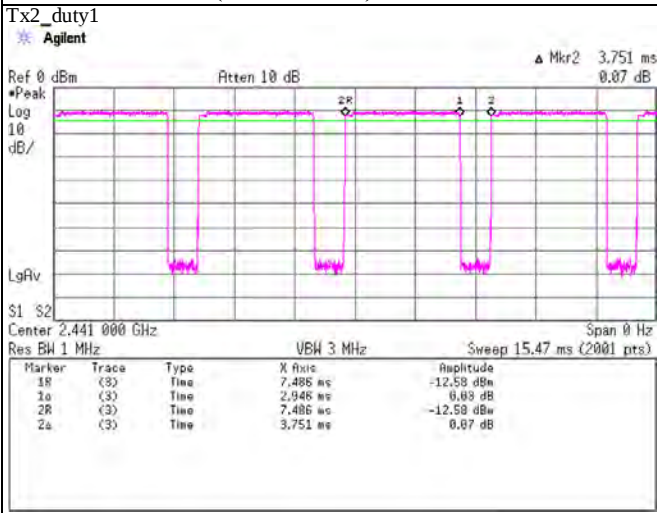
Facsimile : +81 463 50 6401

Spurious emission (Radiated)

Tx, Bluetooth, EDR, PRBS9

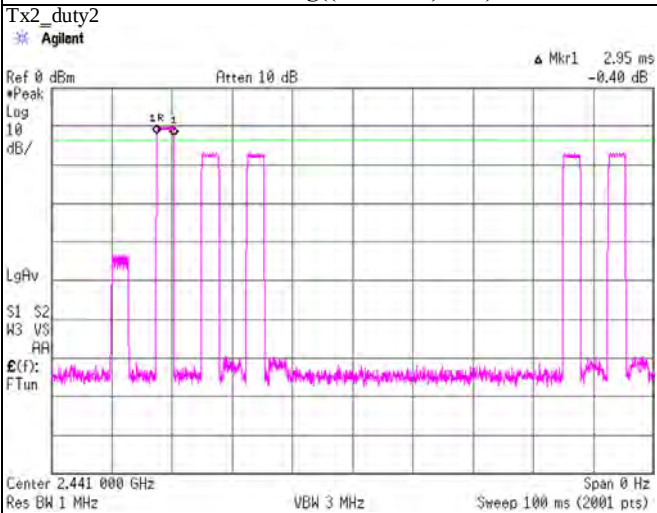
VBW (AV) Calculation

VBW: $1/x = 266.6\text{Hz} < 270\text{Hz}$
x: (Tx on+Tx off) = 3.751ms



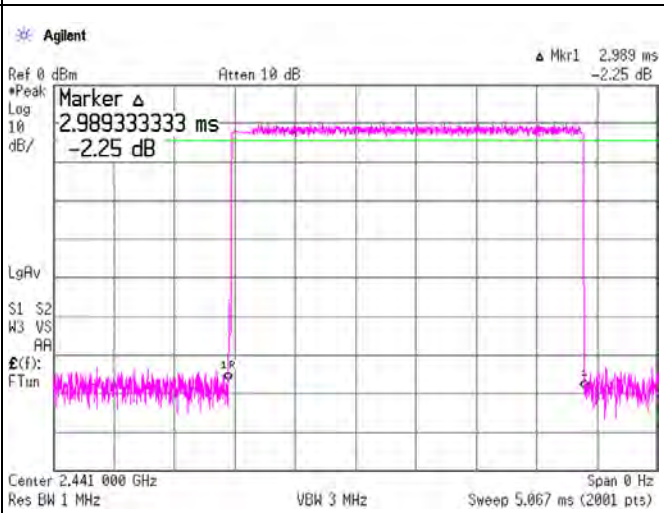
Worst 100ms

Dwell time factor = $20\log((2.989 \times 2)/100) = -24.47\text{dB}$



1cycle On time :

2.989ms



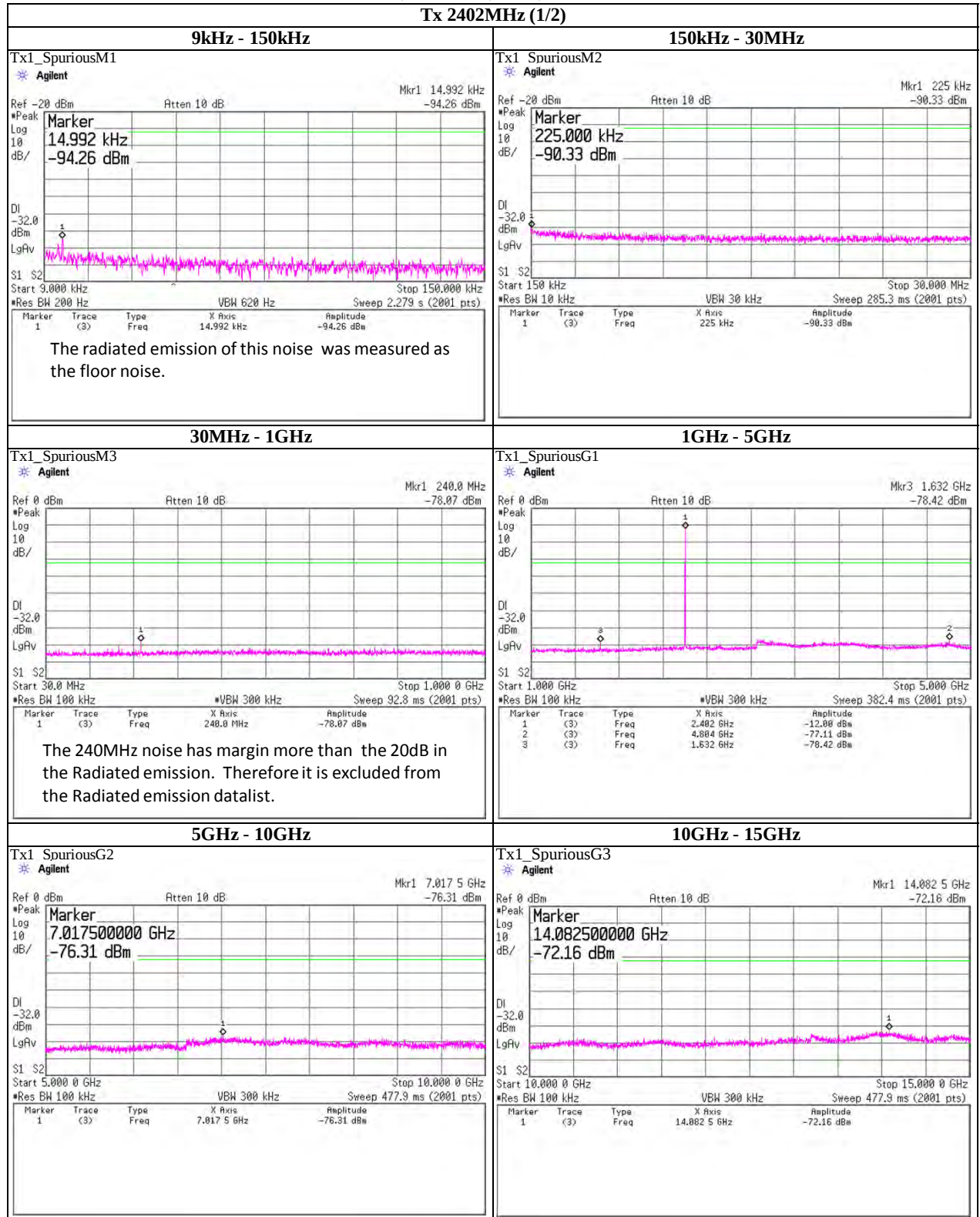
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Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx 2402MHz (1/2)****UL Japan, Inc.****Shonan EMC Lab.**

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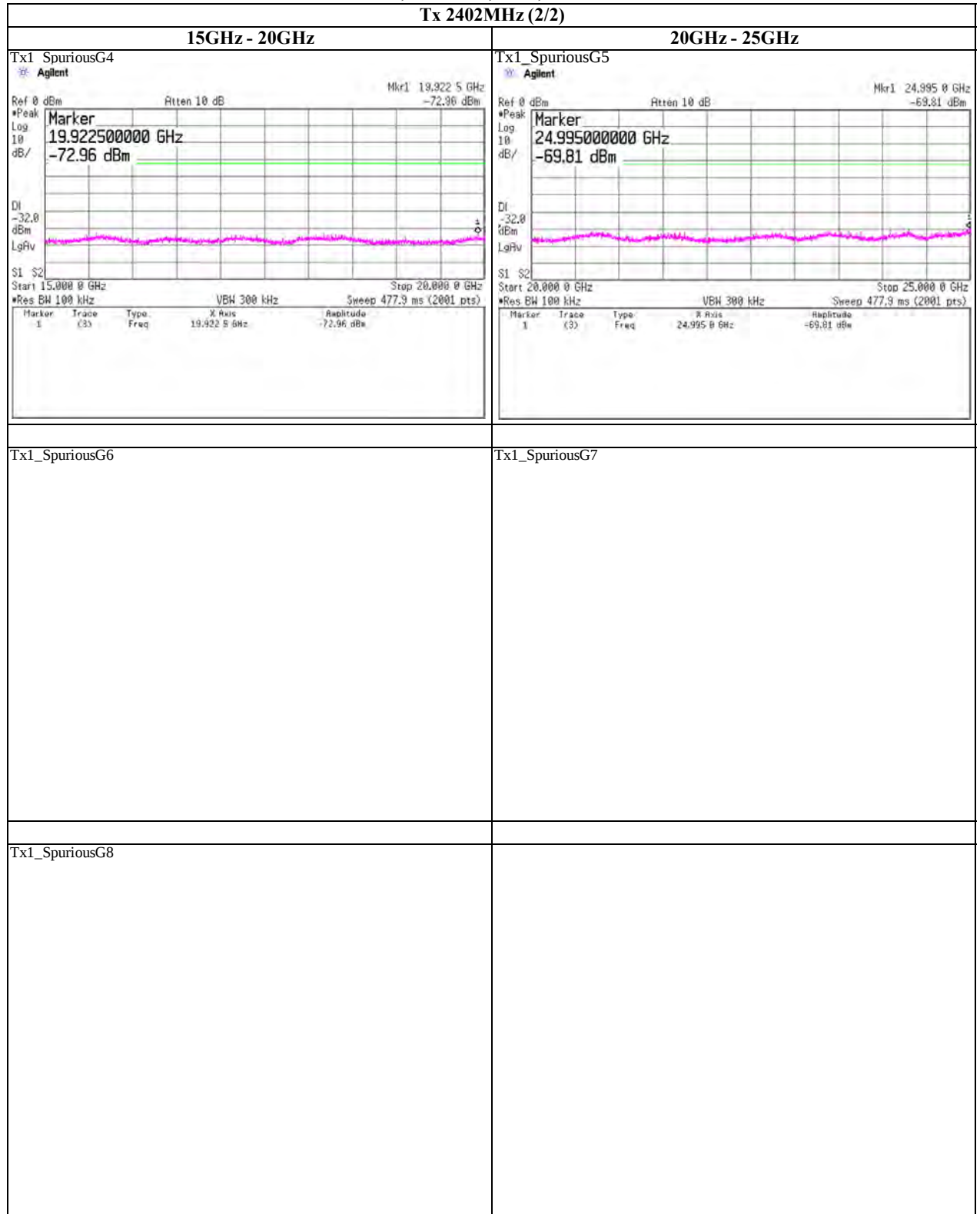
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

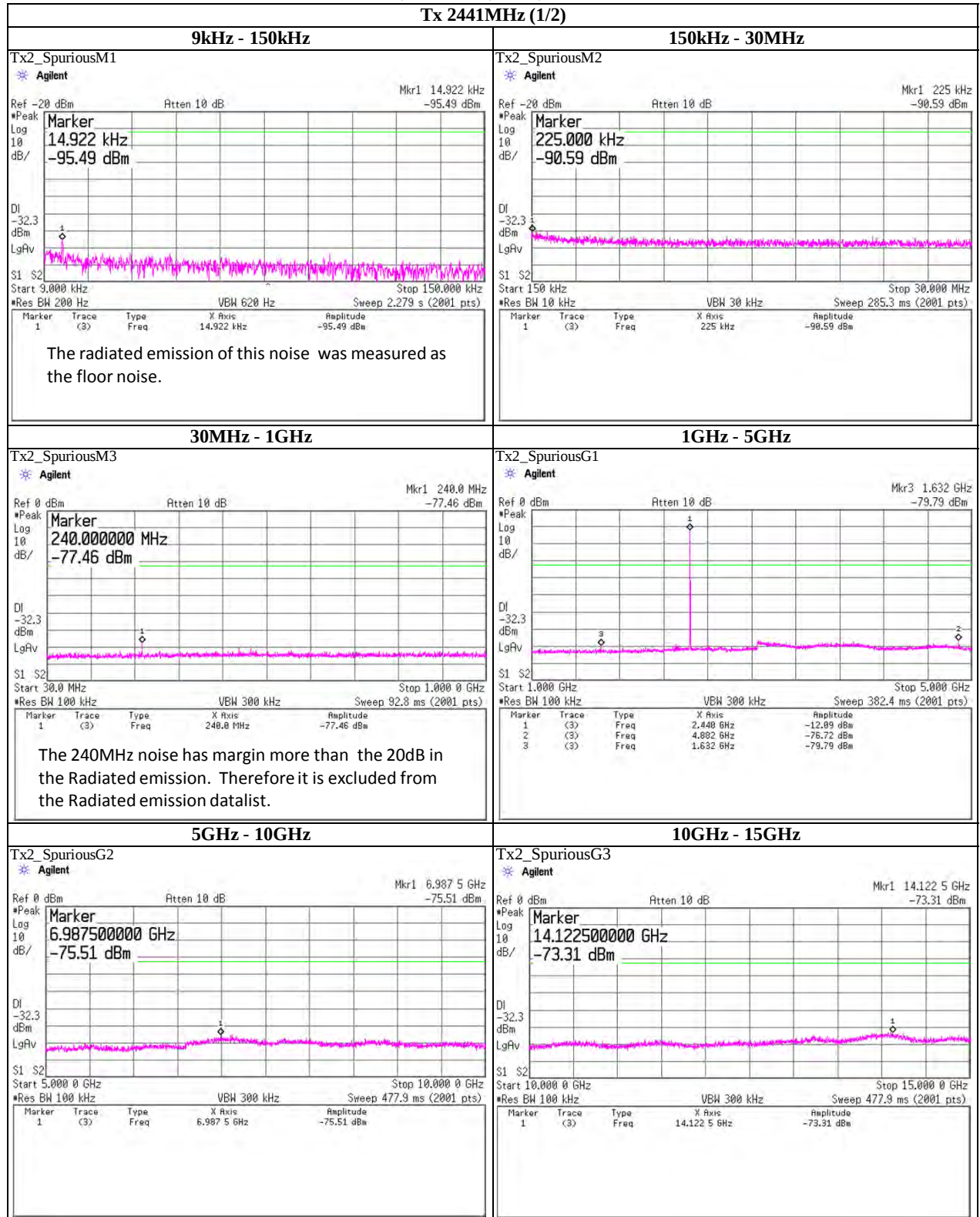
Tx 2402MHz (2/2)

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Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx 2441MHz (1/2)****UL Japan, Inc.****Shonan EMC Lab.**

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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

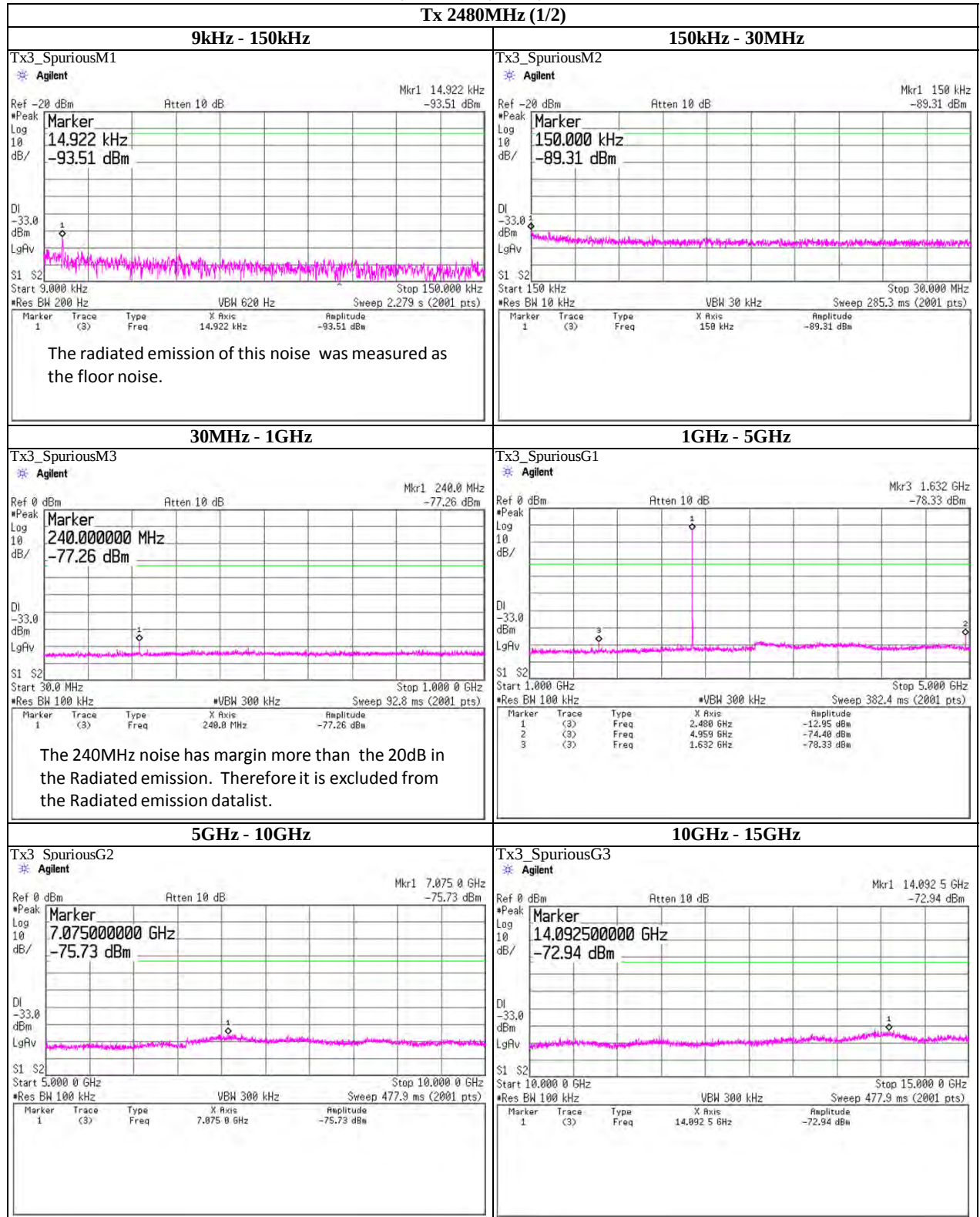
Tx 2441MHz (2/2)

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Spurious emission (Conducted)**Tx, Bluetooth, BDR, PRBS9****Tx 2480MHz (1/2)****UL Japan, Inc.****Shonan EMC Lab.**

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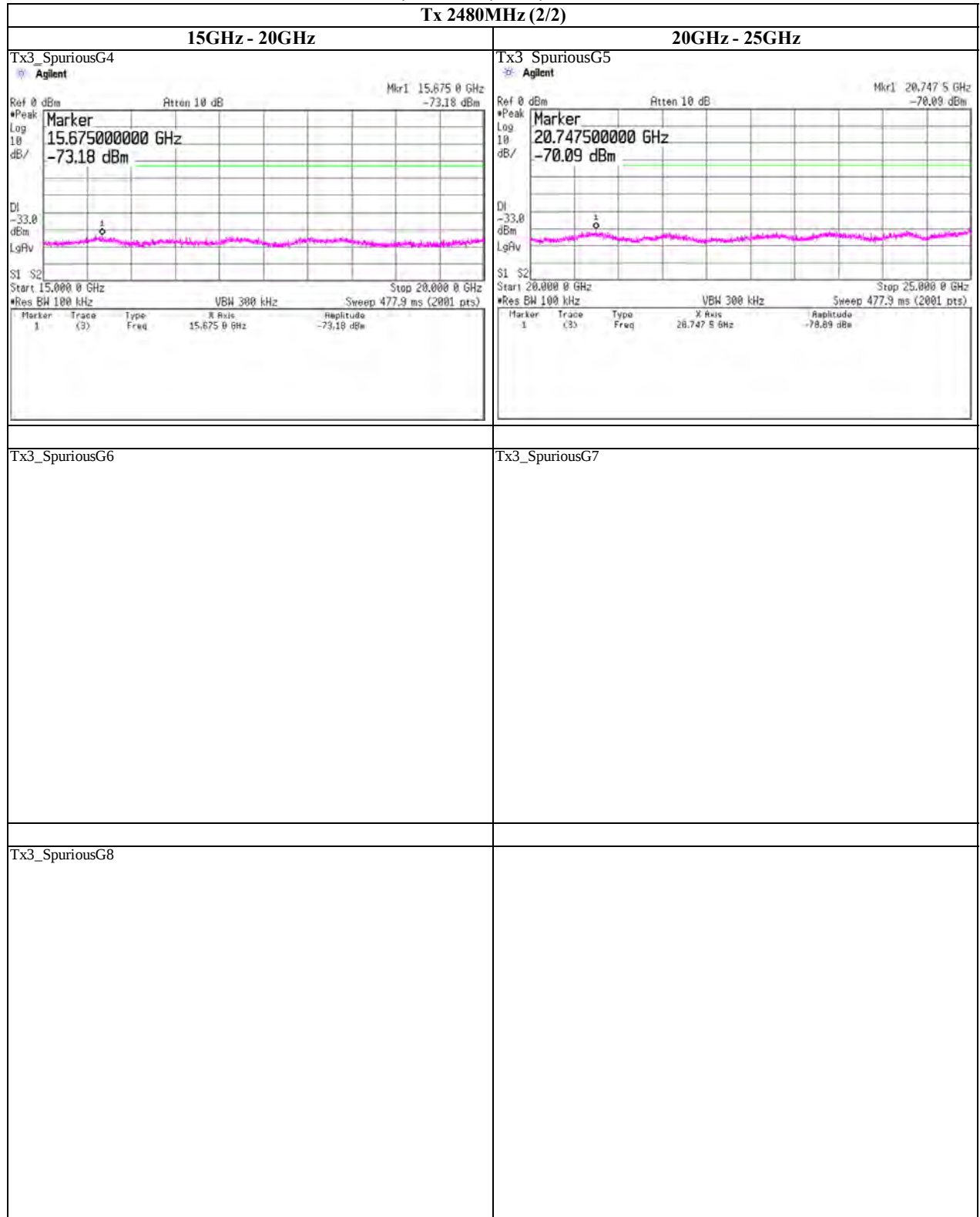
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx 2480MHz (2/2)

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

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

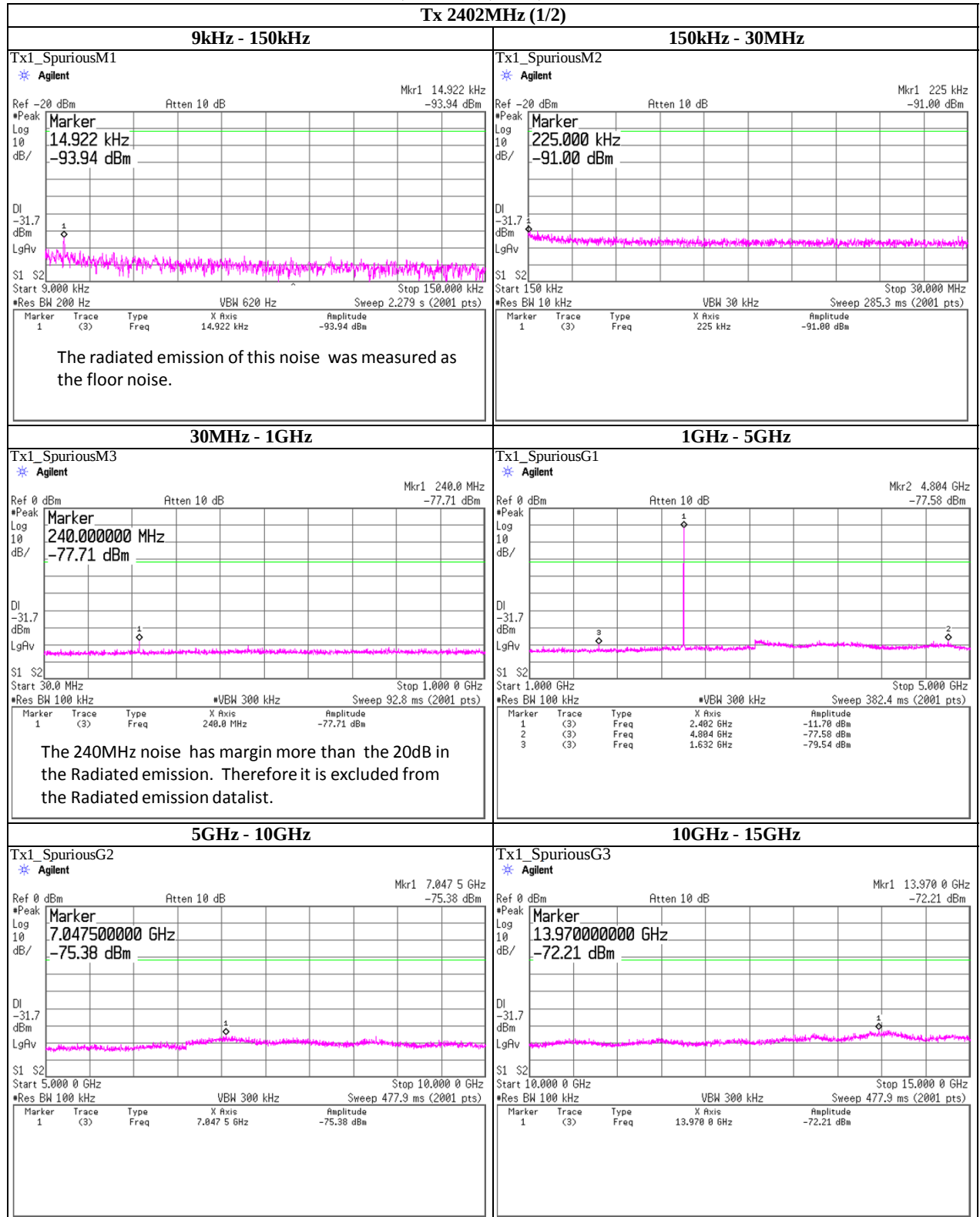
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx 2402MHz (1/2)



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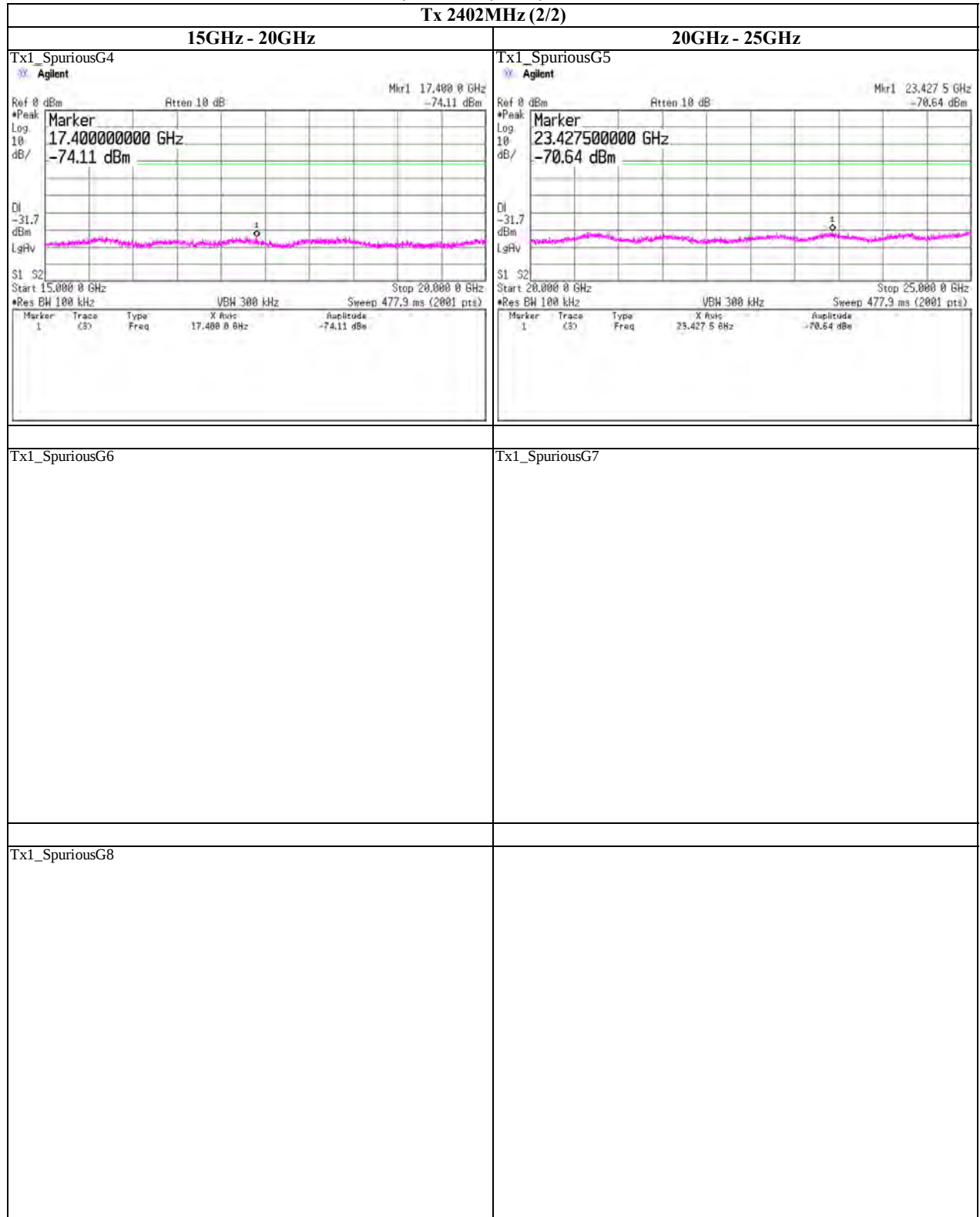
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

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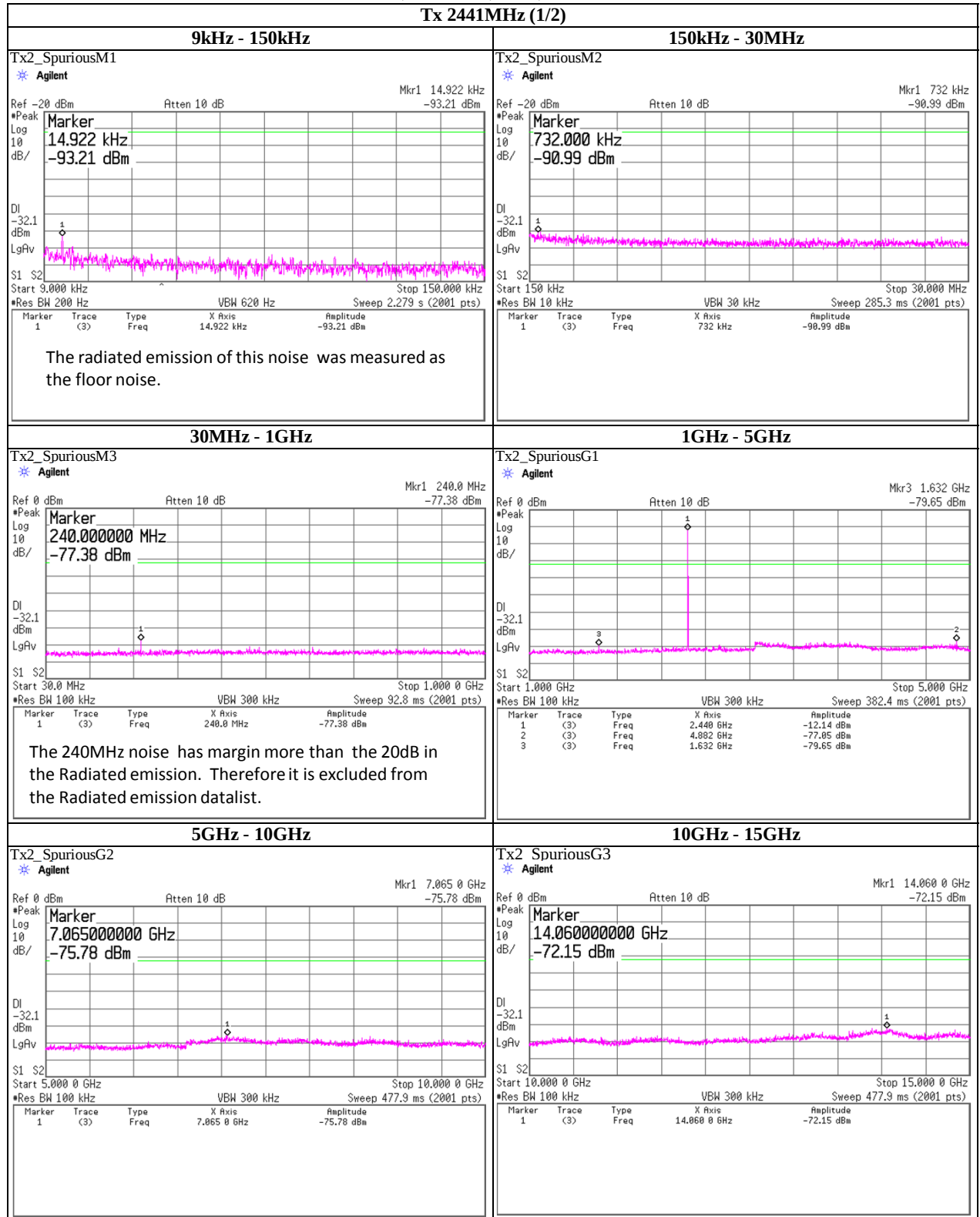
Tx 2402MHz (2/2)

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Spurious emission (Conducted)**Tx, Bluetooth, EDR, PRBS9****Tx 2441MHz (1/2)****UL Japan, Inc.****Shonan EMC Lab.**

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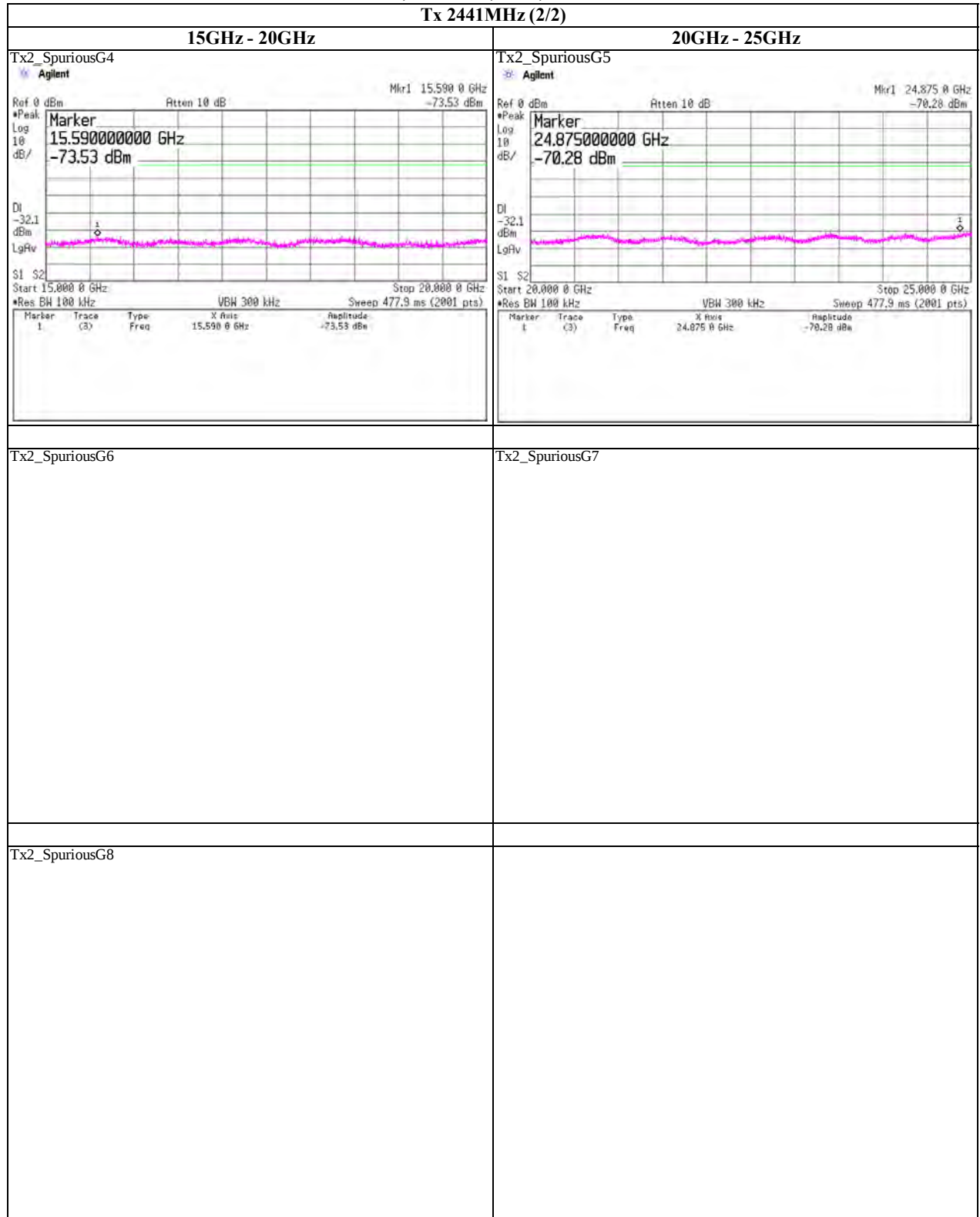
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

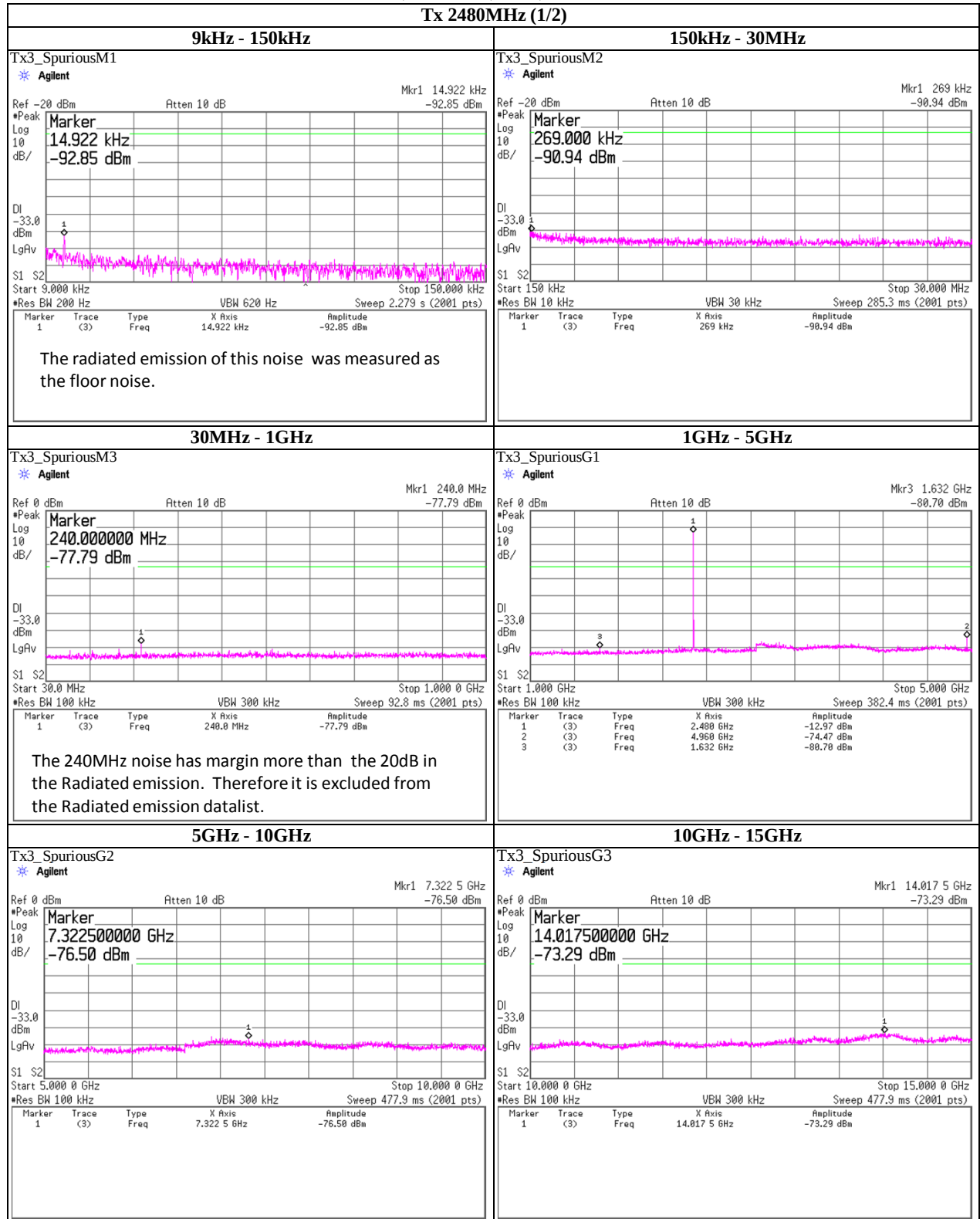
Tx 2441MHz (2/2)

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Spurious emission (Conducted)**Tx, Bluetooth, EDR, PRBS9****Tx 2480MHz (1/2)****UL Japan, Inc.****Shonan EMC Lab.**

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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx 2480MHz (2/2)

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

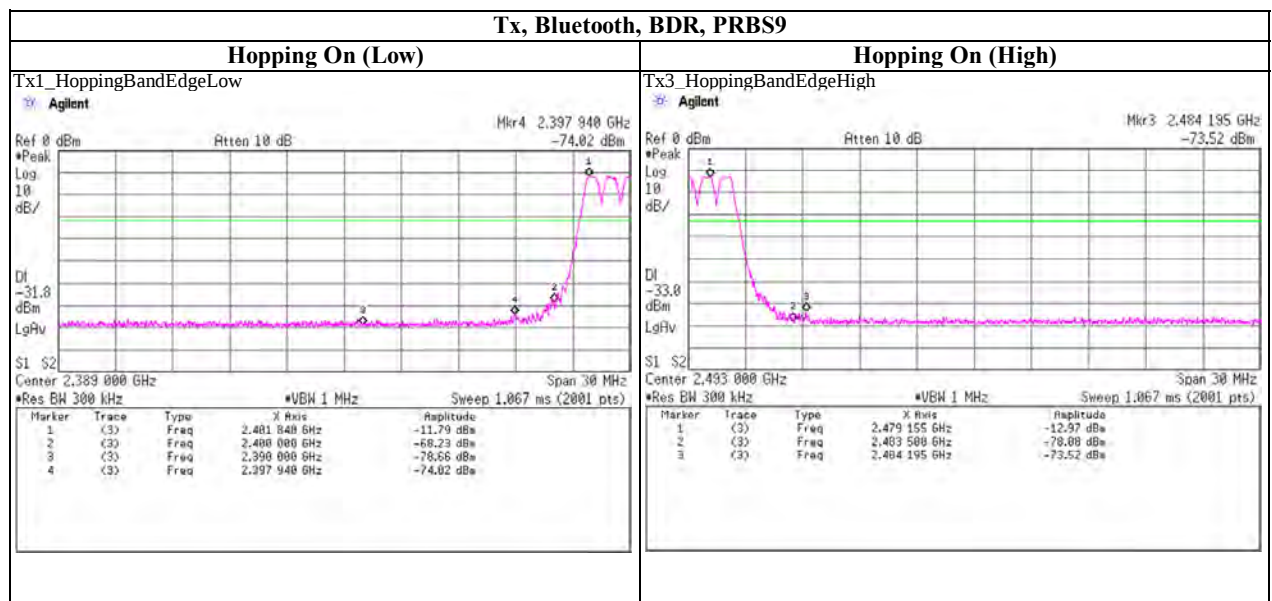
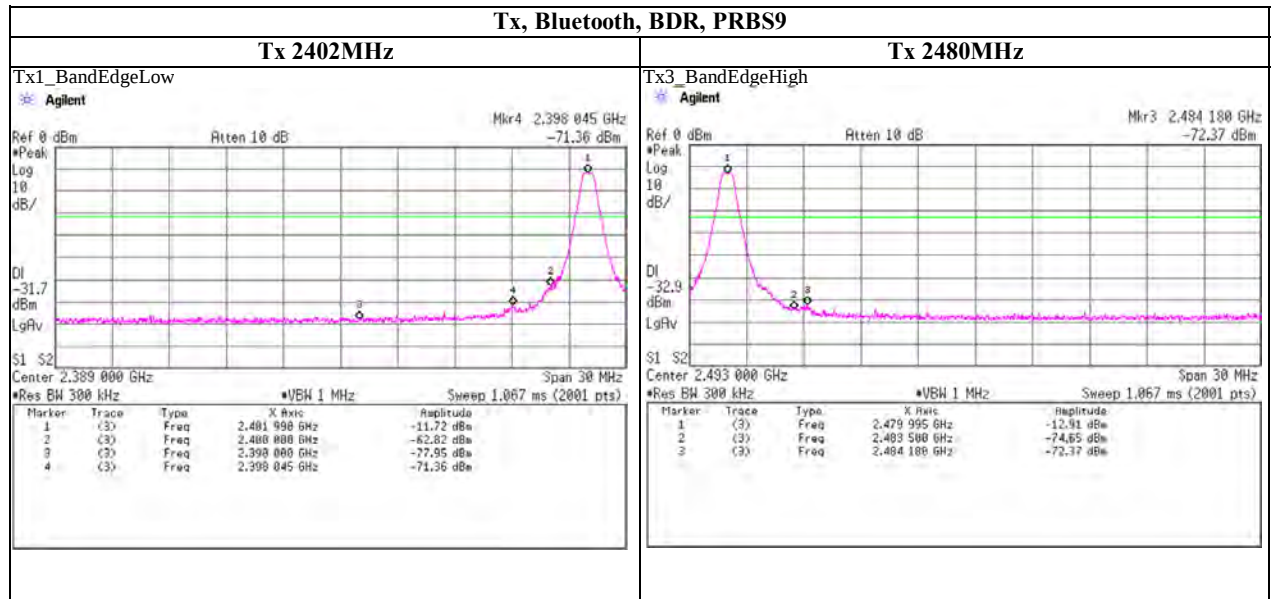
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Band Edge compliance



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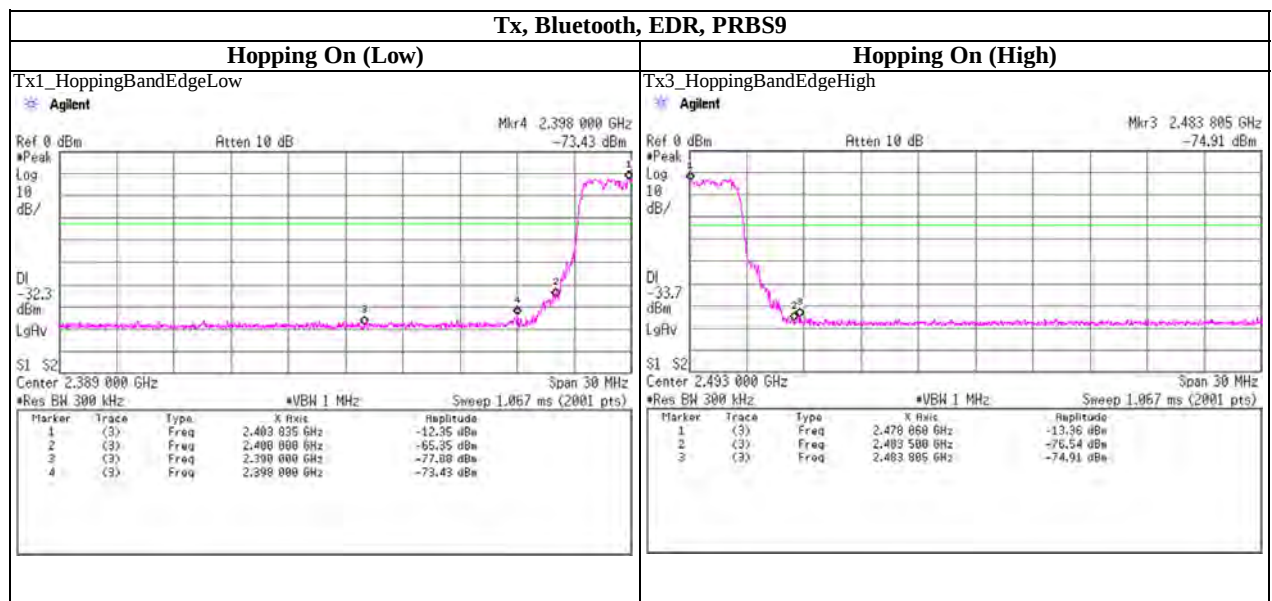
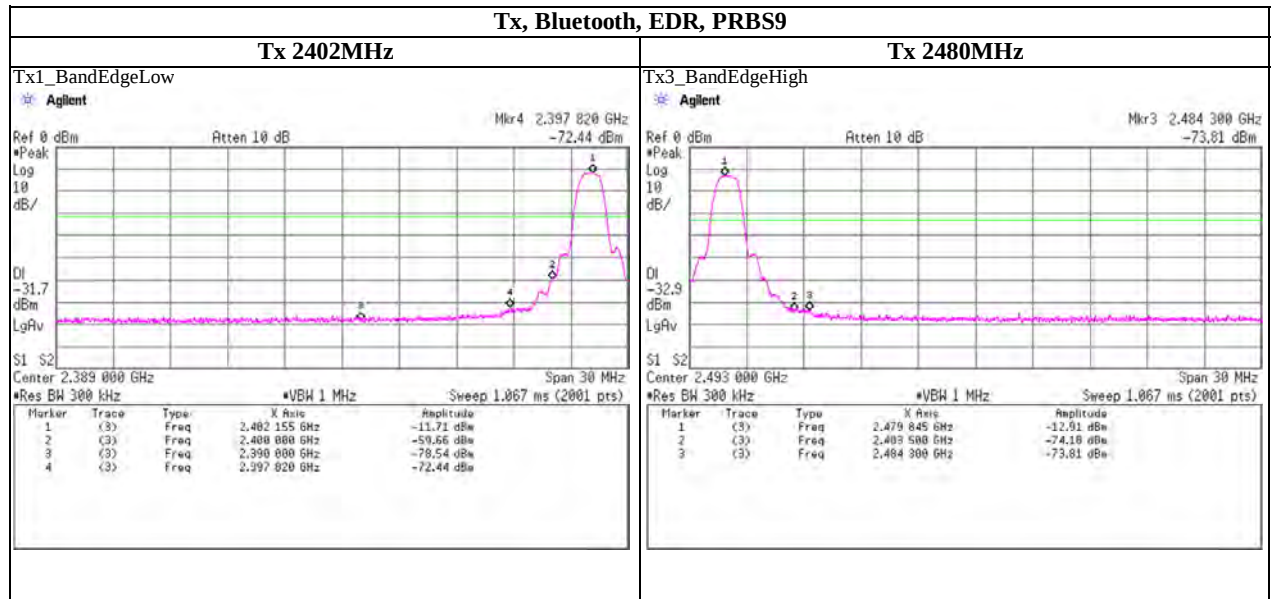
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

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Spurious emission (Conducted)

Band Edge compliance



UL Japan, Inc.

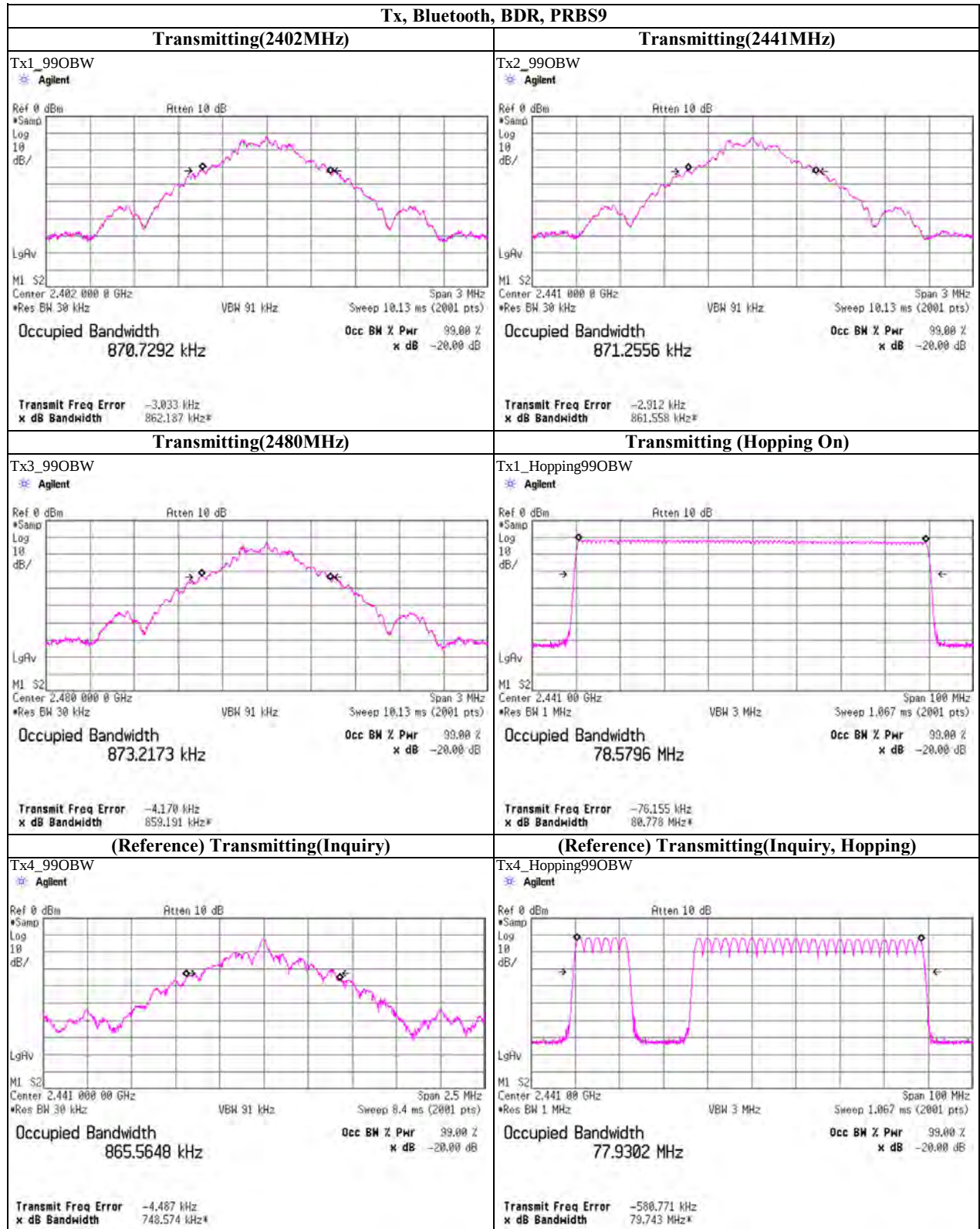
Shonan EMC Lab.

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99% Occupied Bandwidth



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99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
Transmitting(2402MHz)	Transmitting(2441MHz)
Tx1_99OBW Agilent Ref 0 dBm Atten 10 dB *Samp Log 10 dB/ LgAv MI S2 Center 2.402 000 0 GHz Res BW 30 kHz Span 3 MHz VBW 91 kHz Sweep 10.13 ms (2001 pts) Occupied Bandwidth 1.1782 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -1.235 kHz x dB Bandwidth 1.256 MHz*	Tx2_99OBW Agilent Ref 0 dBm Atten 10 dB *Samp Log 10 dB/ LgAv MI S2 Center 2.441 000 0 GHz Res BW 30 kHz Span 3 MHz VBW 91 kHz Sweep 10.13 ms (2001 pts) Occupied Bandwidth 1.1893 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -3.228 kHz x dB Bandwidth 1.274 MHz*
Transmitting(2480MHz)	Transmitting (Hopping On)
Tx3_99OBW Agilent Ref 0 dBm Atten 10 dB *Samp Log 10 dB/ LgAv MI S2 Center 2.480 000 0 GHz Res BW 30 kHz Span 3 MHz VBW 91 kHz Sweep 10.13 ms (2001 pts) Occupied Bandwidth 1.1834 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -2.815 kHz x dB Bandwidth 1.255 MHz*	Tx1_Hopping99OBW Agilent Ref 0 dBm Atten 10 dB *Samp Log 10 dB/ LgAv MI S2 Center 2.441 00 GHz Res BW 1 MHz Span 100 MHz VBW 3 MHz Sweep 1.067 ms (2001 pts) Occupied Bandwidth 78.7276 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -86.368 kHz x dB Bandwidth 81.061 MHz*
Tx4_99OBW	Tx4_Hopping99OBW

UL Japan, Inc.

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Test Report No : 31JE0259-SH-01-A

APPENDIX 3 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	2011/04/12 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2011/04/12 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2010/11/16 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2010/11/24 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2011/03/23 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2011/03/02 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2011/07/19 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2011/04/28 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2011/05/27 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2010/08/17 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2011/02/23 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	RE	2010/11/16 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,LF)	-	RE	-
SAT10-04	Attenuator(above1GHz)	Agilent	8493C-010	74863	RE	2010/12/15 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2010/12/15 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2011/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2011/03/16 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2011/03/16 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2011/02/17 * 12
SAT6-03	Attenuator	JFW	50HF-006N	-	RE	2011/02/17 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2010/10/15 * 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	2011/04/28 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2010/10/15 * 12
STR-03	Test Receiver	Rohde & Schwarz	ESI40	100054/040	RE	2010/07/21 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2010/09/13 * 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 disturbance voltage