

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 September 2, 2011
 Temperature / Humidity 22deg.C , 46%RH
 Engineer Akio Hayashi
 Mode Tx

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
Tx	2404.5	1.083	1.500	>= 0.722
Tx	2428.5	1.060	1.500	>= 0.707
Tx	2452.0	1.063	1.500	>= 0.709

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

No limit applies to 20dB Bandwidth.

UL Japan, Inc.

Shonan EMC Lab.

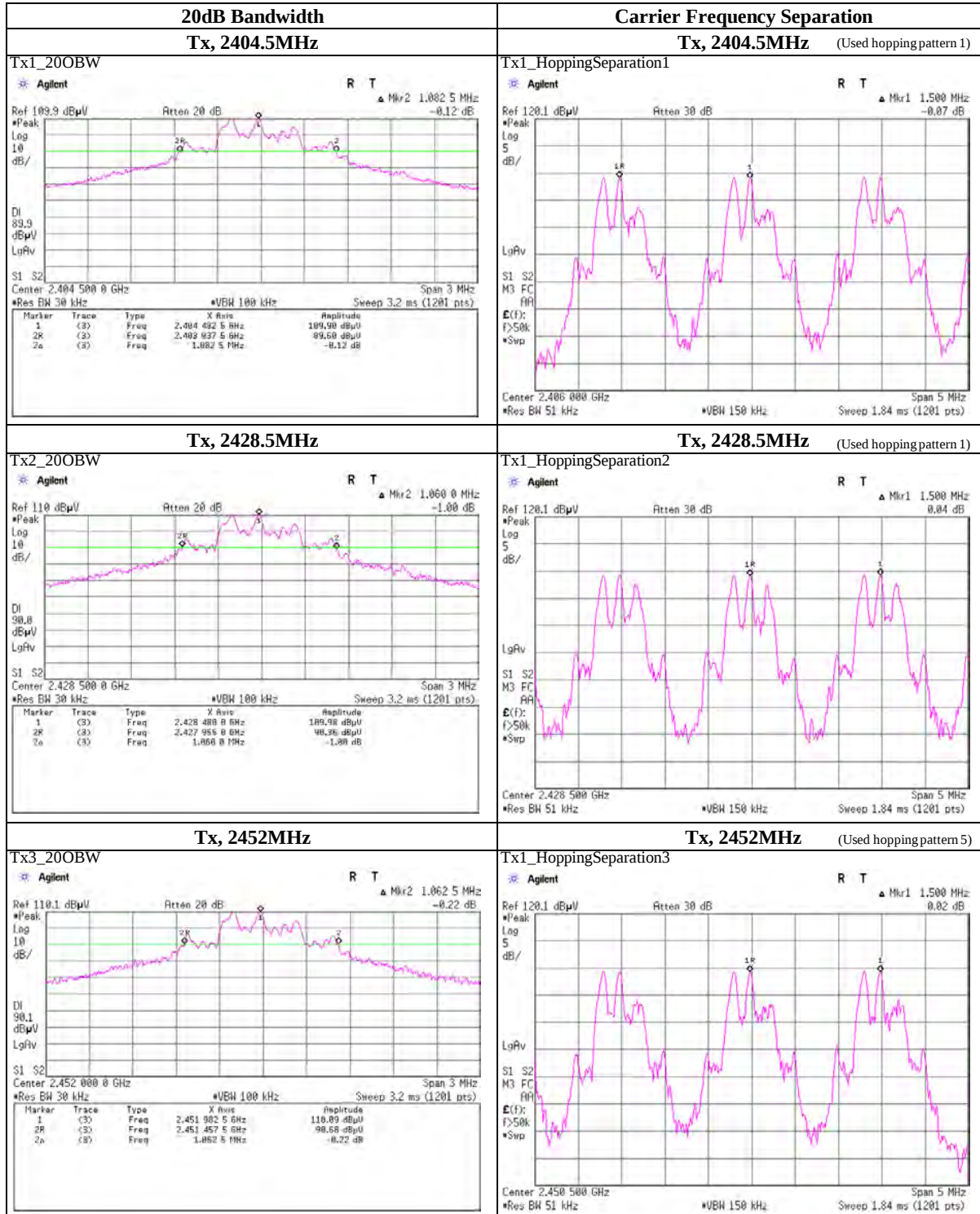
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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20dB Bandwidth and Carrier Frequency Separation

Tx



UL Japan, Inc.

Shonan EMC Lab.

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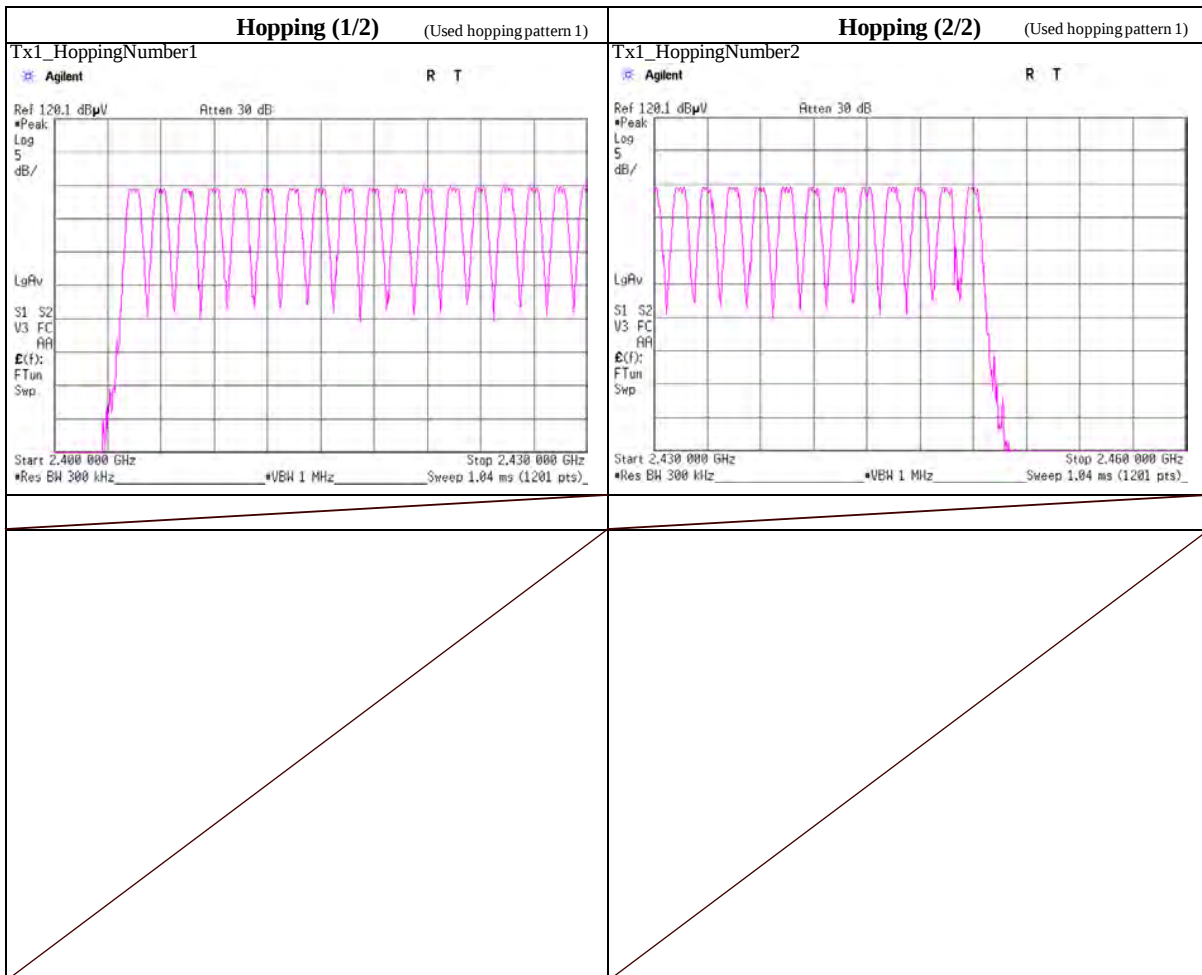
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Number of Hopping Frequency

Test place UL Japan, Inc. Shonan EMC Lab.
 Date September 2, 2011
 Temperature / Humidity 22deg.C , 46%RH
 Engineer Akio Hayashi
 Mode Tx

Mode	Number of Channel [times]	Limit [times]
Tx	30	>= 15



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date September 2, 2011
 Temperature / Humidity 22deg.C , 46%RH
 Engineer Akio Hayashi
 Mode Tx

Mode	Number of transmission in a 12.0(30 Hopping x 0.4) second period	Length of transmission transmission [msec]	Result [msec]	Limit [msec]
Tx	7.0 / 5.0 sec. x 12.0 sec. = 17 times	4.875	83	400

Sample Calculation

Result = Number of transmission x Length of transmission time

Length of transmission transmission[ms] = A+B+C+D+E+F+G+H+I+J+K+L+M+N

= 0.3547 + 0.3534 + 0.3483 + 0.3521 + 0.342 + 0.3445 + 0.3483 + 0.3521 + 0.3395 + 0.3483 + 0.3521 + 0.3471 + 0.3433 + 0.3496

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Dwell time

Tx



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Peak Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date September 2, 2011
 Temperature / Humidity 22deg.C , 46%RH
 Engineer Akio Hayashi
 Mode Tx

(* P/M: Power Meter)

	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Tx	2404.5	3.52	0.74	9.97	14.23	26.49	20.97	125	6.74
Tx	2428.5	3.62	0.74	9.97	14.33	27.10	20.97	125	6.64
Tx	2452.0	3.74	0.74	9.97	14.45	27.86	20.97	125	6.52

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date September 1, 2011
 Temperature / Humidity 26deg.C , 63%RH
 Engineer Kenichi Adachi
 Mode Tx, 2404.5 MHz

(* QP: Quasi-Peak, PK: 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.	32.910	QP	30.2	17.3	6.6	32.1	22.0	40.0	18.0	293	245	
Hori.	71.040	QP	29.4	6.4	7.0	32.1	10.7	40.0	29.3	298	323	
Hori.	543.998	QP	29.9	17.6	9.6	31.9	25.2	46.0	20.8	162	193	
Hori.	575.997	QP	30.0	18.0	9.7	31.9	25.8	46.0	20.2	153	4	
Hori.	2116.479	PK	48.0	26.5	23.8	40.8	57.5	73.9	16.4	106	164	
Hori.	2148.478	PK	47.9	26.6	23.8	40.7	57.6	73.9	16.3	108	97	
Hori.	2388.471	PK	51.9	27.2	24.0	40.6	62.5	73.9	11.4	116	222	
Hori.	2390.000	PK	45.9	27.2	24.0	40.6	56.5	73.9	17.4	116	222	
Hori.	2660.475	PK	47.7	27.9	24.2	40.7	59.1	73.9	14.8	110	229	
Hori.	2692.478	PK	48.9	28.0	24.2	40.7	60.4	73.9	13.5	106	234	
Hori.	2852.402	PK	48.9	28.4	6.1	40.8	42.6	73.9	31.3	105	191	
Hori.	2980.473	PK	48.8	28.7	5.6	41.0	42.1	73.9	31.8	136	2	
Hori.	4808.961	PK	70.6	31.1	6.0	41.5	66.2	73.9	7.7	133	194	
Hori.	12021.390	PK	51.0	39.3	10.2	39.5	61.0	73.9	12.9	142	308	
Hori.	14426.880	PK	57.4	41.6	1.5	40.7	59.8	73.9	14.1	100	124	
Hori.	16831.370	PK	45.7	40.7	2.4	39.8	49.0	73.9	24.9	100	169	
Hori.	19235.820	PK	68.1	40.0	-3.2	48.4	56.5	73.9	17.4	107	162	
Hori.	21640.350	PK	59.3	40.4	-2.5	47.2	50.0	73.9	23.9	109	154	
Hori.	24044.890	PK	52.4	40.2	-2.1	47.2	43.3	73.9	30.6	100	147	
Vert.	32.910	QP	30.7	17.3	6.6	32.1	22.5	40.0	17.5	100	195	
Vert.	71.040	QP	27.9	6.4	7.0	32.1	9.2	40.0	30.8	100	126	
Vert.	543.998	QP	30.4	17.6	9.6	31.9	25.7	46.0	20.3	100	198	
Vert.	575.997	QP	30.3	18.0	9.7	31.9	26.1	46.0	19.9	100	161	
Vert.	2116.479	PK	50.0	26.5	23.8	40.8	59.5	73.9	14.4	104	31	
Vert.	2148.478	PK	47.5	26.6	23.8	40.7	57.2	73.9	16.7	105	34	
Vert.	2388.470	PK	51.2	27.2	24.0	40.6	61.8	73.9	12.1	131	270	
Vert.	2390.000	PK	46.1	27.2	24.0	40.6	56.7	73.9	17.2	131	270	
Vert.	2660.475	PK	47.8	27.9	24.2	40.7	59.2	73.9	14.7	105	27	
Vert.	2692.474	PK	49.5	28.0	24.2	40.7	61.0	73.9	12.9	103	31	
Vert.	2852.402	PK	53.0	28.4	6.1	40.8	46.7	73.9	27.2	100	37	
Vert.	2980.473	PK	54.5	28.7	5.6	41.0	47.8	73.9	26.1	100	218	
Vert.	4808.961	PK	70.3	31.1	6.0	41.5	65.9	73.9	8.0	142	215	
Vert.	12021.390	PK	53.2	39.3	10.2	39.5	63.2	73.9	10.7	100	174	
Vert.	14426.880	PK	55.0	41.6	1.5	40.7	57.4	73.9	16.5	100	346	
Vert.	16831.370	PK	47.6	40.7	2.4	39.8	50.9	73.9	23.0	100	344	
Vert.	19235.820	PK	58.2	40.0	-3.2	48.4	46.6	73.9	27.3	110	21	
Vert.	21640.350	PK	57.3	40.4	-2.5	47.2	48.0	73.9	25.9	111	28	
Vert.	24044.890	PK	50.5	40.2	-2.1	47.2	41.4	73.9	32.5	100	196	

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).

Distance factor: 13GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber
Date	September 1, 2011	
Temperature / Humidity	26deg.C , 63%RH	
Engineer	Kenichi Adachi	
Mode	Tx, 2404.5 MHz	

20dBc Data Sheet (RBW:100kHz, VBW:300kHz) (* PK: Peak, "R100k, V300k"= 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.	2404.5	PK	104.7	27.3	24.0	40.6	115.4	-	-	R100k,V300k, carrier
Hori.	2400	PK	50.6	27.3	24.0	40.6	61.3	95.4	34.1	R100k,V300k,
Hori.	7212.978	PK	68.4	36.5	7.4	40.7	71.6	95.4	23.8	(R100k,V300k)
Hori.	9617.919	PK	61.8	38.2	8.7	40.5	68.2	95.4	27.2	(R100k,V300k)
Vert.	2404.5	PK	102.0	27.3	24.0	40.6	112.7	-	-	R100k,V300k, carrier
Vert.	2400	PK	48.5	27.3	24.0	40.6	59.2	92.7	33.5	R100k,V300k,
Vert.	7212.978	PK	67.9	36.5	7.4	40.7	71.1	92.7	21.6	(R100k,V300k)
Vert.	9617.919	PK	64.1	38.2	8.7	40.5	70.5	92.7	22.2	(R100k,V300k)

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

Dwell time factor relaxation (* AV: Average)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell time Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2116.479	AV	36.2	26.5	23.8	40.8	-26.2	19.5	53.9	34.4	
Hori.	2148.478	AV	36.0	26.6	23.8	40.7	-26.2	19.5	53.9	34.4	
Hori.	2388.471	AV	39.1	27.2	24.0	40.6	-26.2	23.5	53.9	30.4	
Hori.	2390	AV	35.6	27.2	24.0	40.6	-26.2	20.0	53.9	33.9	
Hori.	2660.475	AV	35.8	27.9	24.2	40.7	-26.2	21.0	53.9	32.9	
Hori.	2692.478	AV	36.9	28.0	24.2	40.7	-26.2	22.2	53.9	31.7	
Hori.	2852.402	AV	36.2	28.4	6.1	40.8	-26.2	3.7	53.9	50.2	
Hori.	2980.473	AV	35.7	28.7	5.6	41.0	-26.2	2.8	53.9	51.1	
Hori.	4808.961	AV	57.4	31.1	6.0	41.5	-26.2	26.8	53.9	27.1	
Hori.	12021.39	AV	37.9	39.3	10.2	39.5	-26.2	21.7	53.9	32.2	
Hori.	14426.88	AV	43.2	41.6	1.5	40.7	-26.2	19.4	53.9	34.5	
Hori.	16831.37	AV	34.1	40.7	2.4	39.8	-26.2	11.2	53.9	42.7	
Hori.	19235.82	AV	51.3	40.0	-3.2	48.4	-26.2	13.5	53.9	40.4	
Hori.	21640.35	AV	43.4	40.4	-2.5	47.2	-26.2	7.9	53.9	46.0	
Hori.	24044.89	AV	37.6	40.2	-2.1	47.2	-26.2	2.3	53.9	51.6	
Vert.	2116.479	AV	37.8	26.5	23.8	40.8	-26.2	21.1	53.9	32.8	
Vert.	2148.478	AV	35.9	26.6	23.8	40.7	-26.2	19.4	53.9	34.5	
Vert.	2388.47	AV	37.7	27.2	24.0	40.6	-26.2	22.1	53.9	31.8	
Vert.	2390	AV	35.2	27.2	24.0	40.6	-26.2	19.6	53.9	34.3	
Vert.	2660.475	AV	36.2	27.9	24.2	40.7	-26.2	21.4	53.9	32.5	
Vert.	2692.474	AV	37.3	28.0	24.2	40.7	-26.2	22.6	53.9	31.3	
Vert.	2852.402	AV	38.4	28.4	6.1	40.8	-26.2	5.9	53.9	48.0	
Vert.	2980.473	AV	39.6	28.7	5.6	41.0	-26.2	6.7	53.9	47.2	
Vert.	4808.961	AV	57.9	31.1	6.0	41.5	-26.2	27.3	53.9	26.6	
Vert.	7212.978	AV	54.2	36.5	7.4	40.7	-26.2	31.2	53.9	22.7	
Vert.	12021.39	AV	39.4	39.3	10.2	39.5	-26.2	23.2	53.9	30.7	
Vert.	14426.88	AV	40.9	41.6	1.5	40.7	-26.2	17.1	53.9	36.8	
Vert.	16831.37	AV	35.2	40.7	2.4	39.8	-26.2	12.3	53.9	41.6	
Vert.	19235.82	AV	43.1	40.0	-3.2	48.4	-26.2	5.3	53.9	48.6	
Vert.	21640.35	AV	41.6	40.4	-2.5	47.2	-26.2	6.1	53.9	47.8	
Vert.	24044.89	AV	36.2	40.2	-2.1	47.2	-26.2	0.9	53.9	53.0	

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (Refer to Dwell Time Factor (AV) Calculation)

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

Distance factor: 13GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date September 1, 2011 , September 1, 2011
 Temperature / Humidity 24deg.C , 58%RH , 26deg.C , 63%RH
 Engineer Akio Hayashi , Kenichi Adachi
 Mode Tx, 2428.5 MHz

(* QP: Quasi-Peak, PK: 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.	32.904	QP	30.0	17.3	6.6	32.1	21.8	40.0	18.2	291	242	
Hori.	71.045	QP	29.1	6.4	7.0	32.1	10.4	40.0	29.6	301	321	
Hori.	543.999	QP	29.7	17.6	9.6	31.9	25.0	46.0	21.0	159	189	
Hori.	575.998	QP	30.1	18.0	9.7	31.9	25.9	46.0	20.1	155	11	
Hori.	2140.526	PK	53.9	26.6	23.8	40.7	63.6	73.9	10.3	100	148	
Hori.	2172.442	PK	51.3	26.6	23.8	40.7	61.0	73.9	12.9	100	87	
Hori.	2684.415	PK	50.3	28.0	24.2	40.7	61.8	73.9	12.1	100	240	
Hori.	2716.454	PK	51.1	28.0	24.2	40.7	62.6	73.9	11.3	100	228	
Hori.	4857.000	PK	73.5	31.2	6.0	41.5	69.2	73.9	4.7	120	213	
Hori.	7285.500	PK	70.3	36.7	7.4	40.7	73.7	73.9	0.2	123	239	
Hori.	12142.500	PK	48.0	39.3	10.2	39.5	58.0	73.9	15.9	110	320	
Hori.	14570.940	PK	53.0	41.5	1.6	40.5	55.6	73.9	18.3	100	122	
Hori.	16999.500	PK	45.6	41.2	2.6	39.8	49.6	73.9	24.3	100	167	
Hori.	19427.890	PK	67.2	40.1	-3.1	48.1	56.1	73.9	17.8	103	167	
Hori.	21856.310	PK	58.7	40.4	-2.5	47.7	48.9	73.9	25.0	111	156	
Hori.	24284.880	PK	49.9	40.2	-2.0	47.2	40.9	73.9	33.0	100	144	
Vert.	32.905	QP	30.6	17.3	6.6	32.1	22.4	40.0	17.6	100	190	
Vert.	71.046	QP	27.7	6.4	7.0	32.1	9.0	40.0	31.0	100	121	
Vert.	543.999	QP	30.4	17.6	9.6	31.9	25.7	46.0	20.3	100	201	
Vert.	575.998	QP	30.2	18.0	9.7	31.9	26.0	46.0	20.0	100	158	
Vert.	2140.526	PK	52.6	26.6	23.8	40.7	62.3	73.9	11.6	100	18	
Vert.	2172.442	PK	49.3	26.6	23.8	40.7	59.0	73.9	14.9	100	21	
Vert.	2684.415	PK	48.3	28.0	24.2	40.7	59.8	73.9	14.1	100	19	
Vert.	2716.454	PK	49.8	28.0	24.2	40.7	61.3	73.9	12.6	121	16	
Vert.	4857.000	PK	71.4	31.2	6.0	41.5	67.1	73.9	6.8	115	197	
Vert.	7285.500	PK	68.7	36.7	7.4	40.7	72.1	73.9	1.8	100	84	
Vert.	12142.500	PK	49.3	39.3	10.2	39.5	59.3	73.9	14.6	130	189	
Vert.	14570.940	PK	53.4	41.5	1.6	40.5	56.0	73.9	17.9	100	343	
Vert.	16999.500	PK	45.7	41.2	2.6	39.8	49.7	73.9	24.2	100	347	
Vert.	19427.890	PK	58.0	40.1	-3.1	48.1	46.9	73.9	27.0	112	24	
Vert.	21856.310	PK	57.0	40.4	-2.5	47.7	47.2	73.9	26.7	110	31	
Vert.	24284.880	PK	49.6	40.2	-2.0	47.2	40.6	73.9	33.3	100	187	

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-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber
Date	September 1, 2011	, September 1, 2011
Temperature / Humidity	24deg.C , 58%RH	, 26deg.C , 63%RH
Engineer	Akio Hayashi	, Kenichi Adachi
Mode	Tx, 2428.5 MHz	

20dBc Data Sheet (RBW:100kHz, VBW:300kHz) (* PK: Peak, "R100k, V300k"= 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.	2428.5	PK	99.6	27.3	24.0	40.6	110.3	-	-	R100k,V300k, carrier
Hori.	9714	PK	61.2	38.4	8.7	40.5	67.8	90.3	22.5	R100k,V300k,
Vert.	2428.5	PK	102.8	27.3	24.0	40.6	113.5	-	-	R100k,V300k, carrier
Vert.	9714	PK	65.0	38.4	8.7	40.5	71.6	93.5	21.9	R100k,V300k,

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

Dwell time factor relaxation (* AV: Average)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell time Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2140.526	AV	45.1	26.6	23.8	40.7	-26.2	28.6	53.9	25.3	
Hori.	2172.442	AV	41.8	26.6	23.8	40.7	-26.2	25.3	53.9	28.6	
Hori.	2684.415	AV	39.8	28.0	24.2	40.7	-26.2	25.1	53.9	28.8	
Hori.	2716.454	AV	40.9	28.0	24.2	40.7	-26.2	26.2	53.9	27.7	
Hori.	4857	AV	65.3	31.2	6.0	41.5	-26.2	34.8	53.9	19.1	
Hori.	7285.5	AV	59.8	36.7	7.4	40.7	-26.2	37.0	53.9	16.9	
Hori.	12142.5	AV	35.1	39.3	10.2	39.5	-26.2	18.9	53.9	35.0	
Hori.	14570.94	AV	39.2	41.5	1.6	40.5	-26.2	15.6	53.9	38.3	
Hori.	16999.5	AV	34.0	41.2	2.6	39.8	-26.2	11.8	53.9	42.1	
Hori.	19427.89	AV	50.1	40.1	-3.1	48.1	-26.2	12.8	53.9	41.1	
Hori.	21856.31	AV	42.6	40.4	-2.5	47.7	-26.2	6.6	53.9	47.3	
Hori.	24284.88	AV	36.9	40.2	-2.0	47.2	-26.2	1.7	53.9	52.2	
Vert.	2140.526	AV	41.7	26.6	23.8	40.7	-26.2	25.2	53.9	28.7	
Vert.	2172.442	AV	38.9	26.6	23.8	40.7	-26.2	22.4	53.9	31.5	
Vert.	2684.415	AV	37.5	28.0	24.2	40.7	-26.2	22.8	53.9	31.1	
Vert.	2716.454	AV	39.2	28.0	24.2	40.7	-26.2	24.5	53.9	29.4	
Vert.	4857	AV	63.0	31.2	6.0	41.5	-26.2	32.5	53.9	21.4	
Vert.	7285.5	AV	58.3	36.7	7.4	40.7	-26.2	35.5	53.9	18.4	
Vert.	12142.5	AV	36.3	39.3	10.2	39.5	-26.2	20.1	53.9	33.8	
Vert.	14570.94	AV	39.6	41.5	1.6	40.5	-26.2	16.0	53.9	37.9	
Vert.	16999.5	AV	34.1	41.2	2.6	39.8	-26.2	11.9	53.9	42.0	
Vert.	19427.89	AV	42.7	40.1	-3.1	48.1	-26.2	5.4	53.9	48.5	
Vert.	21856.31	AV	41.3	40.4	-2.5	47.7	-26.2	5.3	53.9	48.6	
Vert.	24284.88	AV	36.1	40.2	-2.0	47.2	-26.2	0.9	53.9	53.0	

Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (Refer to Dwell Time Factor (AV) Calculation)

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

Distance factor: 13GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date September 1, 2011
 Temperature / Humidity 26deg.C , 63%RH
 Engineer Kenichi Adachi
 Mode Tx, 2452.0 MHz

(* QP: Quasi-Peak, PK: 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.	32.897	QP	30.3	17.3	6.6	32.1	22.1	40.0	17.9	299	244	
Hori.	71.048	QP	29.6	6.4	7.0	32.1	10.9	40.0	29.1	297	318	
Hori.	543.999	QP	29.8	17.6	9.6	31.9	25.1	46.0	20.9	156	201	
Hori.	575.999	QP	30.0	18.0	9.7	31.9	25.8	46.0	20.2	152	3	
Hori.	2163.982	PK	48.2	26.6	23.8	40.7	57.9	73.9	16.0	107	165	
Hori.	2195.975	PK	47.5	26.7	23.8	40.7	57.3	73.9	16.6	108	89	
Hori.	2483.500	PK	45.5	27.5	24.0	40.5	56.5	73.9	17.4	113	223	
Hori.	2707.982	PK	47.3	28.0	24.2	40.7	58.8	73.9	15.1	109	232	
Hori.	2739.978	PK	48.5	28.1	24.2	40.7	60.1	73.9	13.8	109	234	
Hori.	2899.978	PK	48.1	28.5	5.9	40.9	41.6	73.9	32.3	110	178	
Hori.	4903.958	PK	73.8	31.3	6.0	41.5	69.6	73.9	4.3	128	190	
Hori.	7355.948	PK	69.2	36.8	7.3	40.7	72.6	73.9	1.3	119	241	
Hori.	12259.920	PK	51.5	39.3	10.3	39.5	61.6	73.9	12.3	133	311	
Hori.	14711.930	PK	52.6	41.5	1.6	40.2	55.5	73.9	18.4	100	121	
Hori.	17164.000	PK	45.6	42.4	2.7	39.7	51.0	73.9	22.9	100	178	
Hori.	19615.890	PK	64.0	40.1	-3.0	48.1	53.0	73.9	20.9	102	163	
Hori.	22067.950	PK	50.8	40.4	-2.4	48.0	40.8	73.9	33.1	108	151	
Hori.	24519.890	PK	47.0	40.2	-1.9	47.3	38.0	73.9	35.9	108	149	
Vert.	32.897	QP	30.8	17.3	6.6	32.1	22.6	40.0	17.4	100	184	
Vert.	71.055	QP	27.5	6.4	7.0	32.1	8.8	40.0	31.2	100	125	
Vert.	543.999	QP	30.2	17.6	9.6	31.9	25.5	46.0	20.5	100	207	
Vert.	575.999	QP	30.1	18.0	9.7	31.9	25.9	46.0	20.5	100	164	
Vert.	2163.982	PK	48.9	26.6	23.8	40.7	58.6	73.9	15.3	111	18	
Vert.	2195.975	PK	47.6	26.7	23.8	40.7	57.4	73.9	16.5	111	21	
Vert.	2483.500	PK	45.3	27.5	24.0	40.5	56.3	73.9	17.6	130	273	
Vert.	2707.982	PK	48.1	28.0	24.2	40.7	59.6	73.9	14.3	120	24	
Vert.	2739.978	PK	49.1	28.1	24.2	40.7	60.7	73.9	13.2	120	27	
Vert.	2899.978	PK	53.3	28.5	5.9	40.9	46.8	73.9	27.1	110	233	
Vert.	4903.958	PK	73.7	31.3	6.0	41.5	69.5	73.9	4.4	123	212	
Vert.	7355.948	PK	67.5	36.8	7.3	40.7	70.9	73.9	3.0	101	83	
Vert.	12259.920	PK	53.1	39.3	10.3	39.5	63.2	73.9	10.7	100	178	
Vert.	14711.930	PK	53.0	41.5	1.6	40.2	55.9	73.9	18.0	100	334	
Vert.	17164.000	PK	45.7	42.4	2.7	39.7	51.1	73.9	22.8	100	334	
Vert.	19615.890	PK	56.5	40.1	-3.0	48.1	45.5	73.9	28.4	109	27	
Vert.	22067.950	PK	48.8	40.4	-2.4	48.0	38.8	73.9	35.1	106	34	
Vert.	24519.890	PK	46.8	40.2	-1.9	47.3	37.8	73.9	36.1	106	189	

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).

Distance factor: 13GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Semi Anechoic Chamber
Date	September 1, 2011	
Temperature / Humidity	26deg.C , 63%RH	
Engineer	Kenichi Adachi	
Mode	Tx, 2452.0 MHz	

20dBc Data Sheet (RBW:100kHz, VBW:300kHz) (* PK: Peak, "R100k, V300k"= RBW 100kHz, VBW 300kHz)

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2452	PK	104.4	27.4	24.0	40.5	115.3	-	-	R100k,V300k, carrier
Hori.	9807.933	PK	62.0	38.6	8.8	40.5	68.9	95.3	26.4	R100k,V300k,
Vert.	2452	PK	102.3	27.4	24.0	40.5	113.2	-	-	R100k,V300k, carrier
Vert.	9807.933	PK	63.9	38.6	8.8	40.5	70.8	93.2	22.4	R100k,V300k,

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

Dwell time factor relaxation (* AV: Average)

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Dwell time Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2163.982	AV	36.3	26.6	23.8	40.7	-26.2	19.8	53.9	34.1	
Hori.	2195.975	AV	35.8	26.7	23.8	40.7	-26.2	19.4	53.9	34.5	
Hori.	2483.5	AV	34.9	27.5	24.0	40.5	-26.2	19.7	53.9	34.2	
Hori.	2707.982	AV	35.6	28.0	24.2	40.7	-26.2	20.9	53.9	33.0	
Hori.	2739.978	AV	36.7	28.1	24.2	40.7	-26.2	22.1	53.9	31.8	
Hori.	2899.978	AV	35.5	28.5	5.9	40.9	-26.2	2.8	53.9	51.1	
Hori.	4903.958	AV	60.3	31.3	6.0	41.5	-26.2	29.9	53.9	24.0	
Hori.	7355.948	AV	55.0	36.8	7.3	40.7	-26.2	32.2	53.9	21.7	
Hori.	12259.92	AV	38.1	39.3	10.3	39.5	-26.2	22.0	53.9	31.9	
Hori.	14711.93	AV	38.8	41.5	1.6	40.2	-26.2	15.5	53.9	38.4	
Hori.	17164	AV	34.1	42.4	2.7	39.7	-26.2	13.3	53.9	40.6	
Hori.	19615.89	AV	47.3	40.1	-3.0	48.1	-26.2	10.1	53.9	43.8	
Hori.	22067.95	AV	35.3	40.4	-2.4	48.0	-26.2	-0.9	53.9	54.8	
Hori.	24519.89	AV	35.1	40.2	-1.9	47.3	-26.2	-0.1	53.9	54.0	
Vert.	2163.982	AV	36.7	26.6	23.8	40.7	-26.2	20.2	53.9	33.7	
Vert.	2195.975	AV	35.8	26.7	23.8	40.7	-26.2	19.4	53.9	34.5	
Vert.	2483.5	AV	34.7	27.5	24.0	40.5	-26.2	19.5	53.9	34.4	
Vert.	2707.982	AV	36.4	28.0	24.2	40.7	-26.2	21.7	53.9	32.2	
Vert.	2739.978	AV	36.8	28.1	24.2	40.7	-26.2	22.2	53.9	31.7	
Vert.	2899.978	AV	41.8	28.5	5.9	40.9	-26.2	9.1	53.9	44.8	
Vert.	4903.958	AV	60.1	31.3	6.0	41.5	-26.2	29.7	53.9	24.2	
Vert.	7355.948	AV	53.3	36.8	7.3	40.7	-26.2	30.5	53.9	23.4	
Vert.	12259.92	AV	39.2	39.3	10.3	39.5	-26.2	23.1	53.9	30.8	
Vert.	14711.93	AV	39.3	41.5	1.6	40.2	-26.2	16.0	53.9	37.9	
Vert.	17164	AV	34.2	42.4	2.7	39.7	-26.2	13.4	53.9	40.5	
Vert.	19615.89	AV	42.3	40.1	-3.0	48.1	-26.2	5.1	53.9	48.8	
Vert.	22067.95	AV	34.9	40.4	-2.4	48.0	-26.2	-1.3	53.9	55.2	
Vert.	24519.89	AV	35.2	40.2	-1.9	47.3	-26.2	0.0	53.9	53.9	

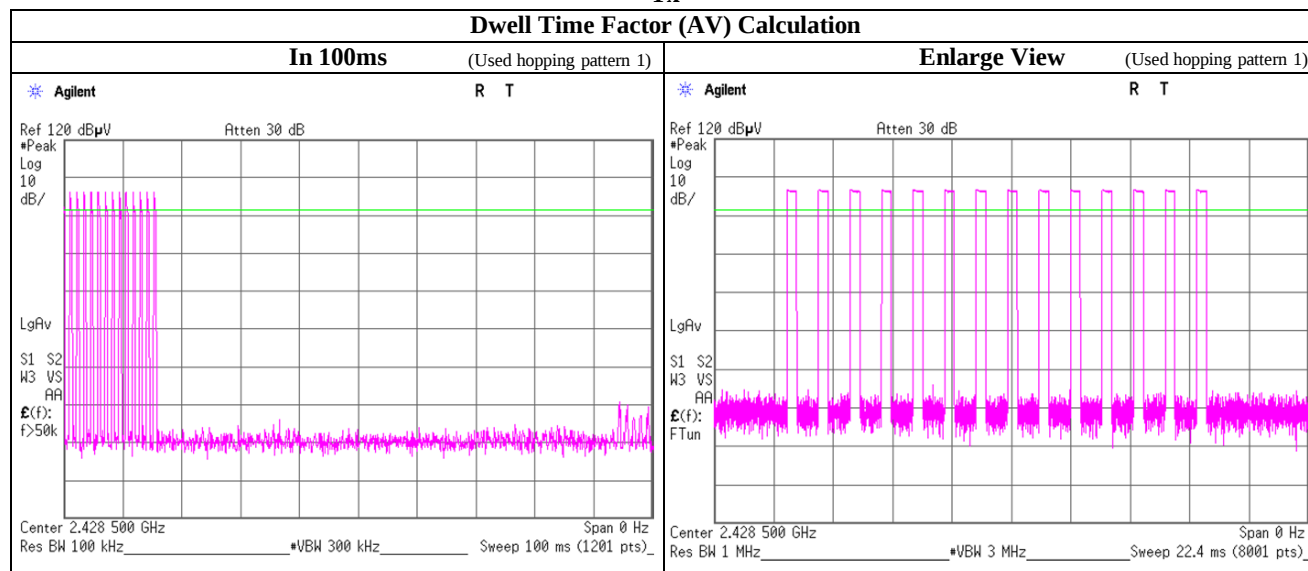
Result = Reading + Ant Factor + Loss(Cable+Attenuator+Filter-Distance factor(above 13GHz)) - Gain(Amplifier) + Dwell time factor (Refer to Dwell Time Factor (AV) Calculation)

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

Distance factor: 13GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Dwell Time Factor (Radiated)

Tx



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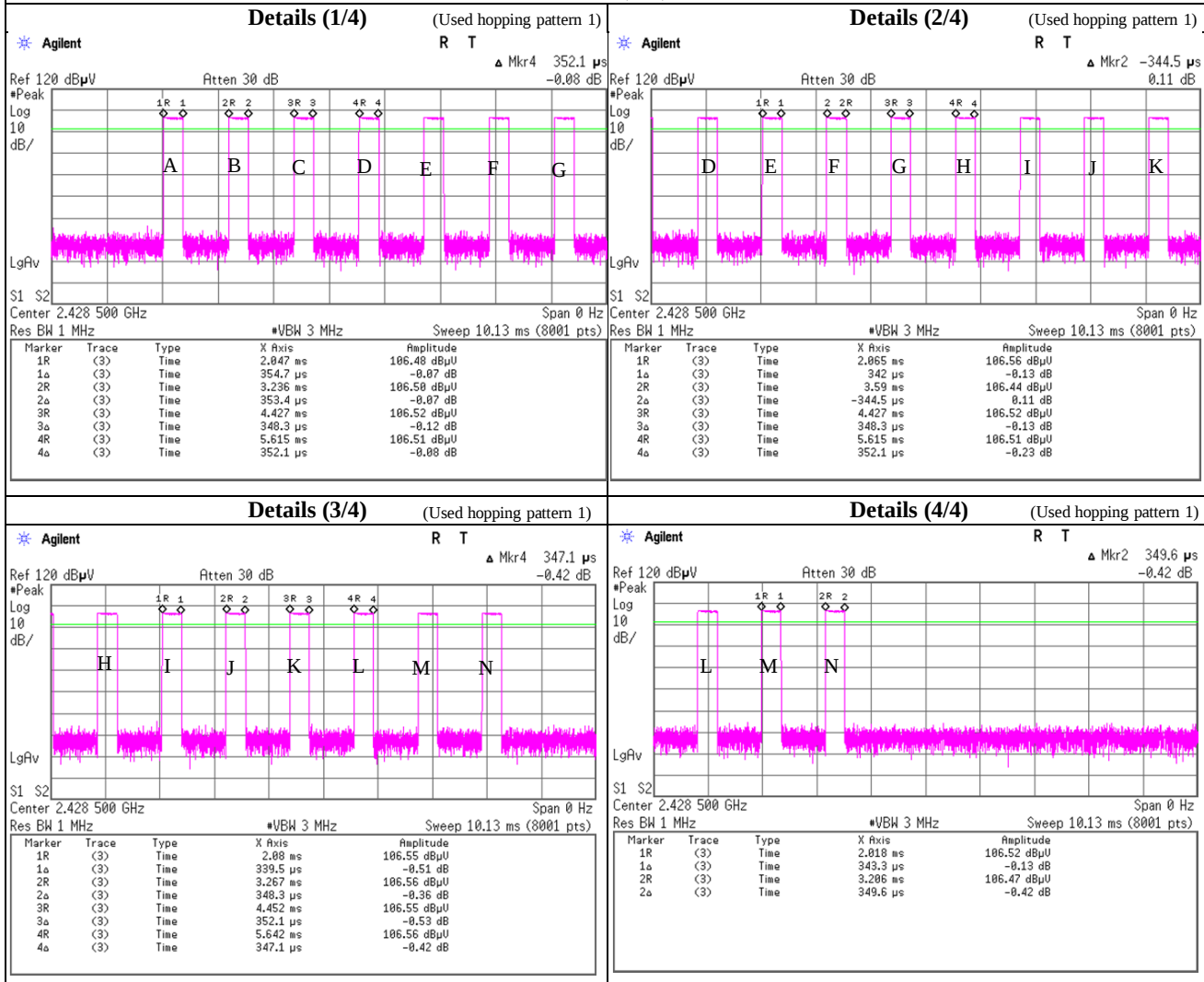
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Dwell Time Factor (Radiated)

Tx

Dwell Time Factor (AV) Calculation

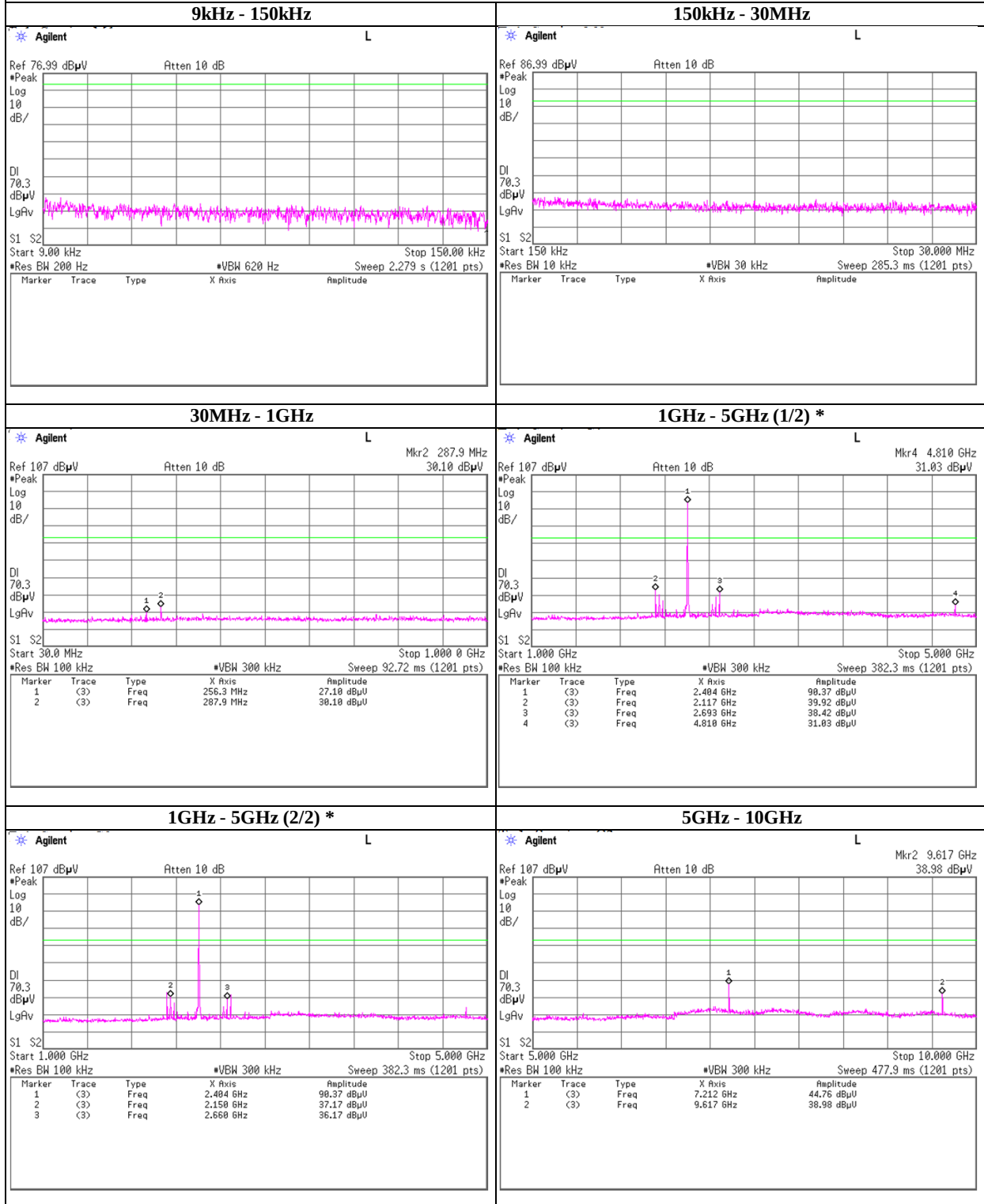


* 4.8753 [ms] = A+B+C+D+E+F+G+H+I+J+K+L+M+N
Result = 0.3547 + 0.3534 + 0.3483 + 0.3521 + 0.342 + 0.3445 + 0.3483 + 0.3521 + 0.3395 + 0.3483 + 0.3521 + 0.3471 + 0.3433 + 0.3496
 * 4.875* AV: Average
 = 0.35
 * AV: Average

Spurious emission (Conducted)

Tx

Tx, 2404.5MHz (1/2)



* Number of Marker is limited to 4. Therefore, the two charts are the same waveform but the marked points are changed.

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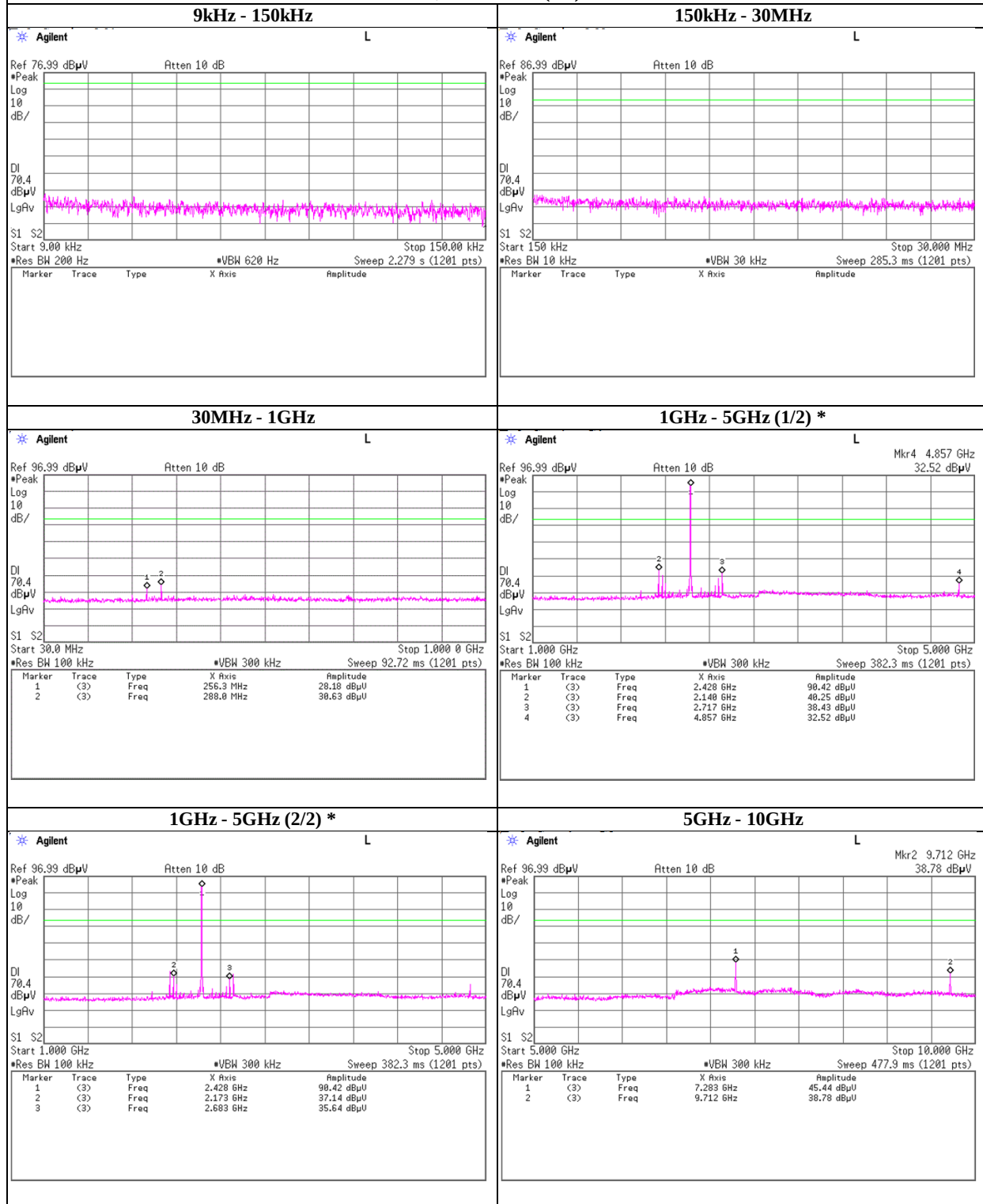
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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx

Tx, 2428.5MHz (1/2)



* Number of Marker is limited to 4. Therefore, the two charts are the same waveform but the marked points are changed.

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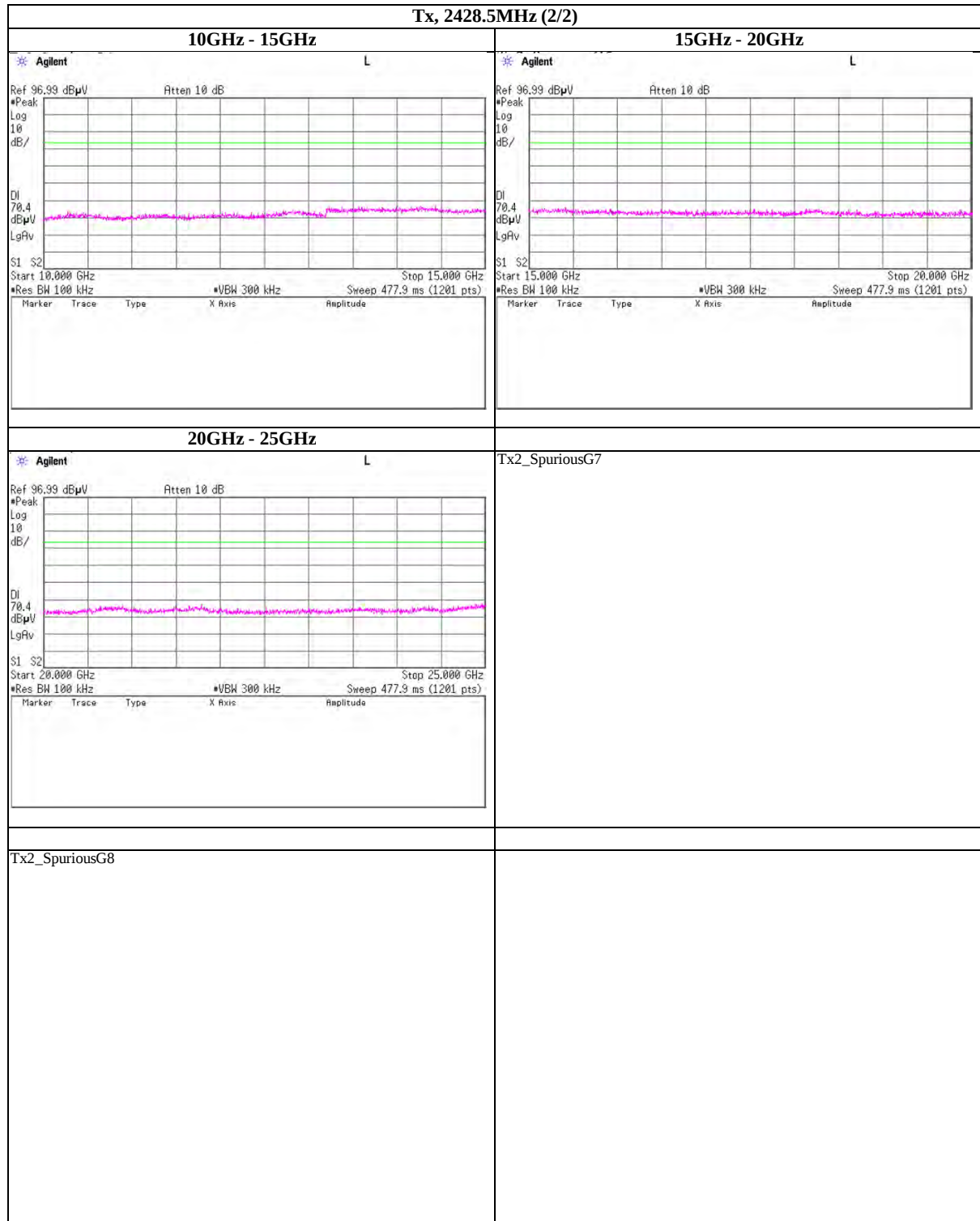
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Spurious emission (Conducted)

Tx

Tx, 2428.5MHz (2/2)

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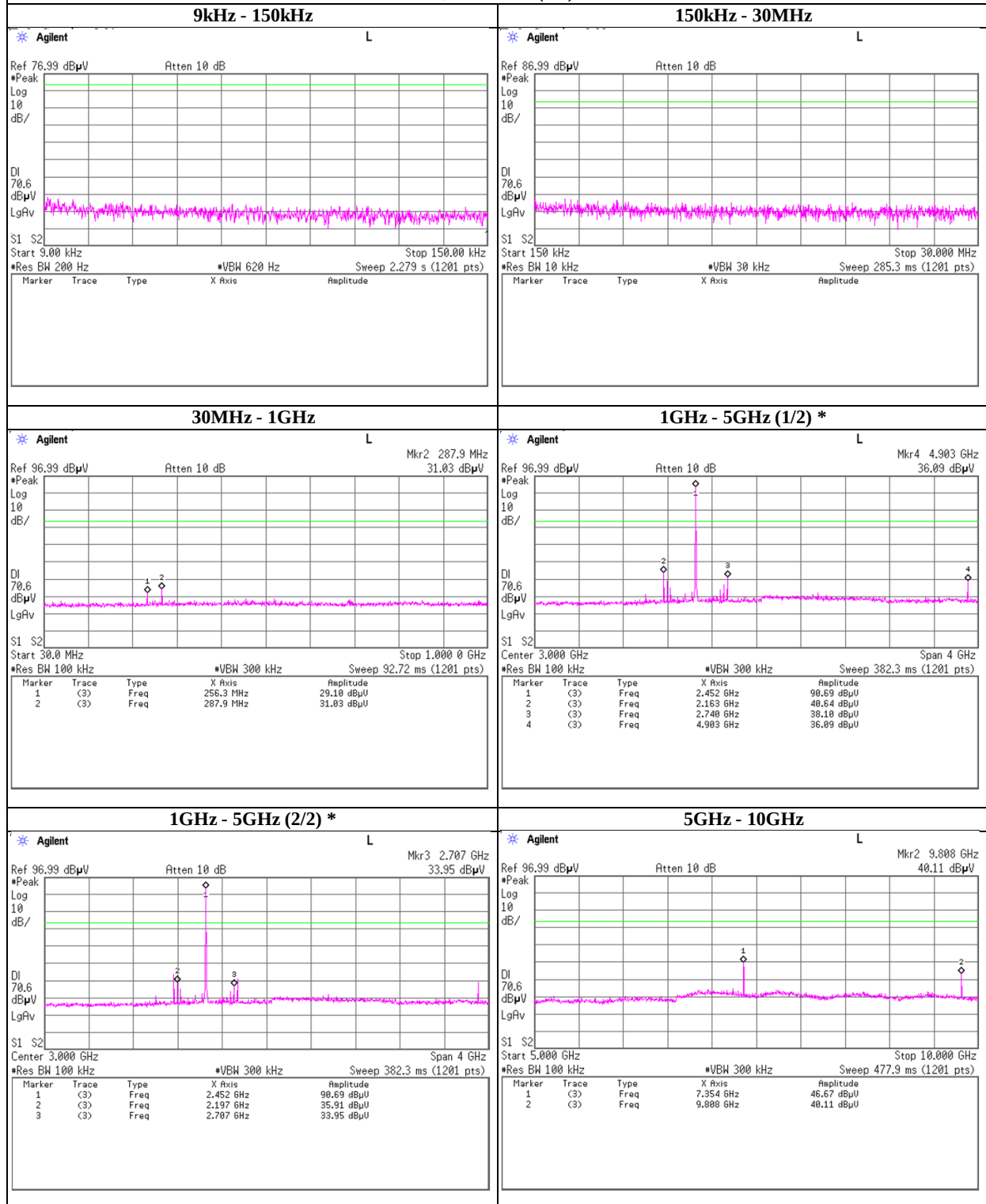
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Spurious emission (Conducted)

Tx

Tx, 2452MHz (1/2)



* Number of Marker is limited to 4. Therefore, the two charts are the same waveform but the marked points are changed.

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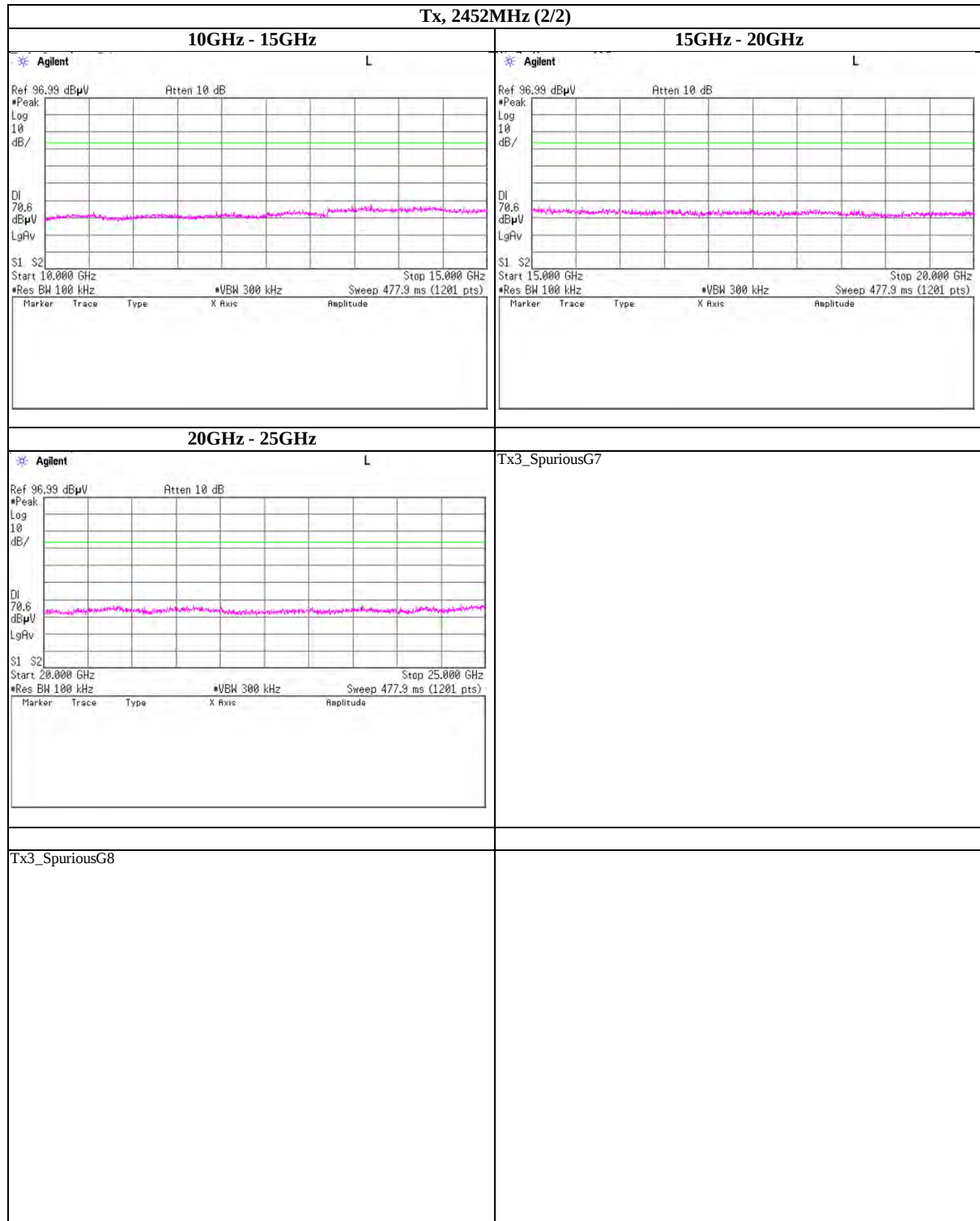
Telephone : +81 463 50 6400

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Spurious emission (Conducted)

Tx

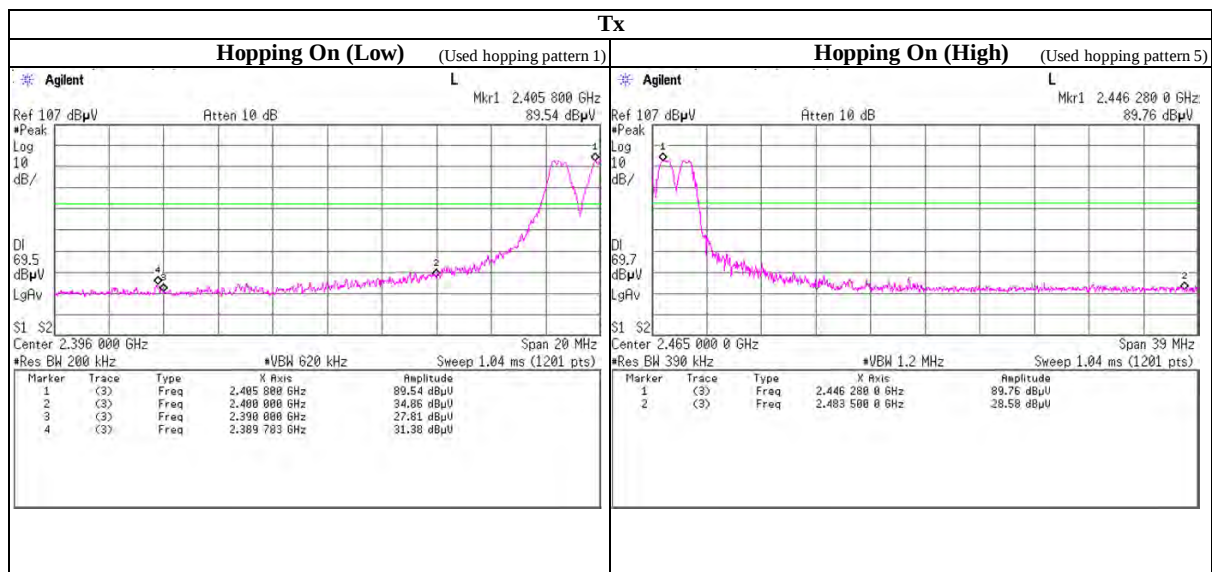
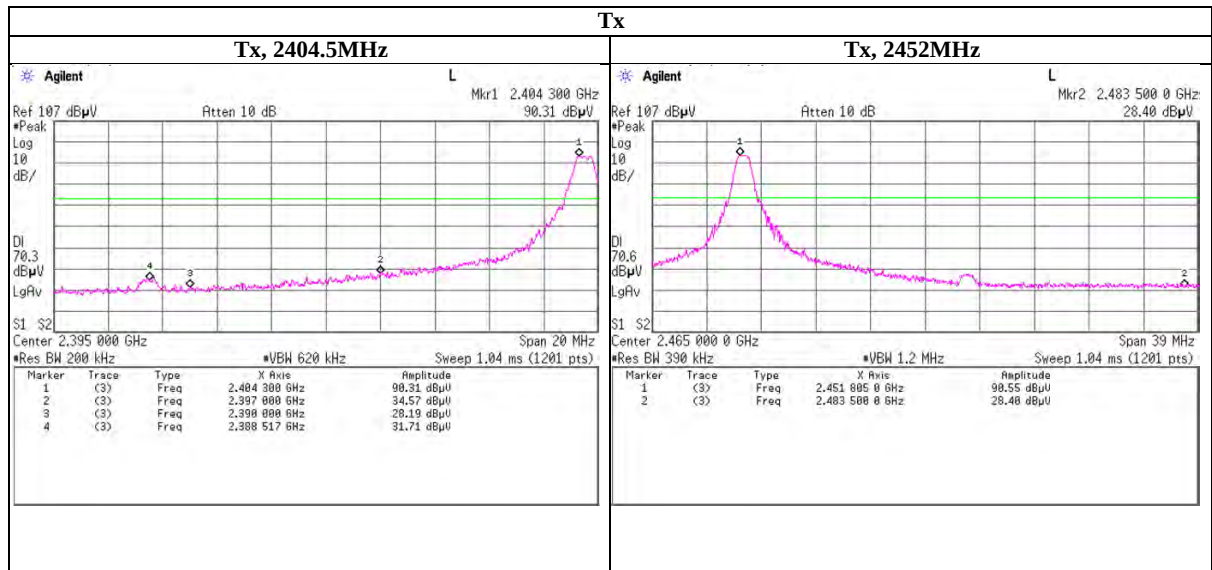
Tx, 2452MHz (2/2)

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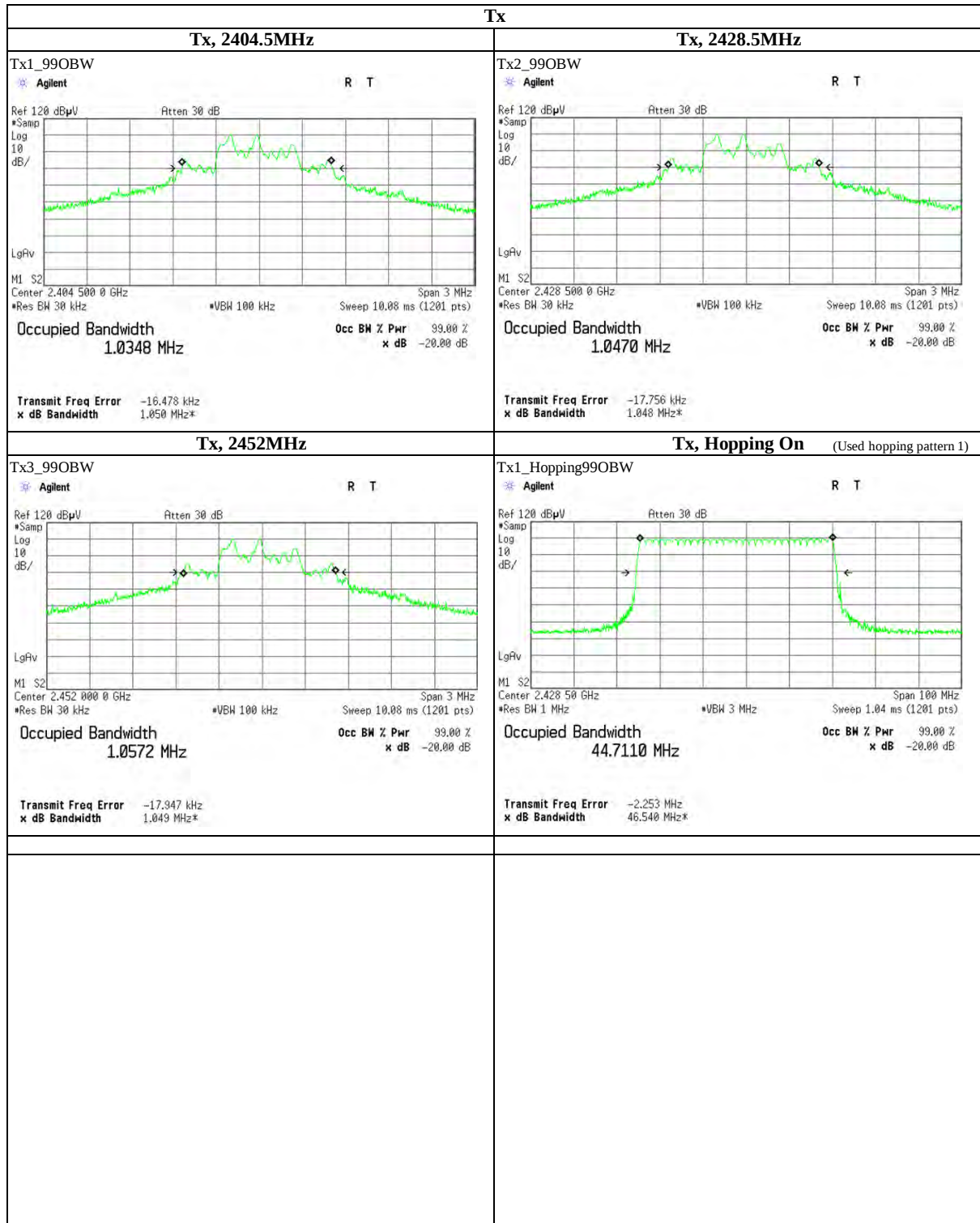
Spurious emission (Conducted)**Band Edge compliance****UL Japan, Inc.****Shonan EMC Lab.**

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99% Occupied Bandwidth



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APPENDIX 3

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
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	2011/08/28 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2011/02/23 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE, AT	2011/03/07 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI, MF)	-	RE	-
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2010/12/15 * 12
SAT20-01	Attenuator(above1GHz)	Agilent	8493C-020	74889	RE	2010/12/15 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	AT	2011/03/23 * 12
SAT20-03	Attenuator	Agilent	8493C-020	74891	AT	2011/03/23 * 12
SCC-H2	Microwave cable	Hirose Electric	U.FL-2LP-066J1-A-(200)	-	AT	Pre Check
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2011/03/16 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2011/03/16 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2011/03/15 * 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	2011/07/28 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2010/09/13 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2011/03/07 * 12
SAT10-04	Attenuator(above1GHz)	Agilent	8493C-010	74863	AT	2010/12/15 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2011/04/12 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2011/04/12 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2011/03/02 * 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