

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2010/12/21

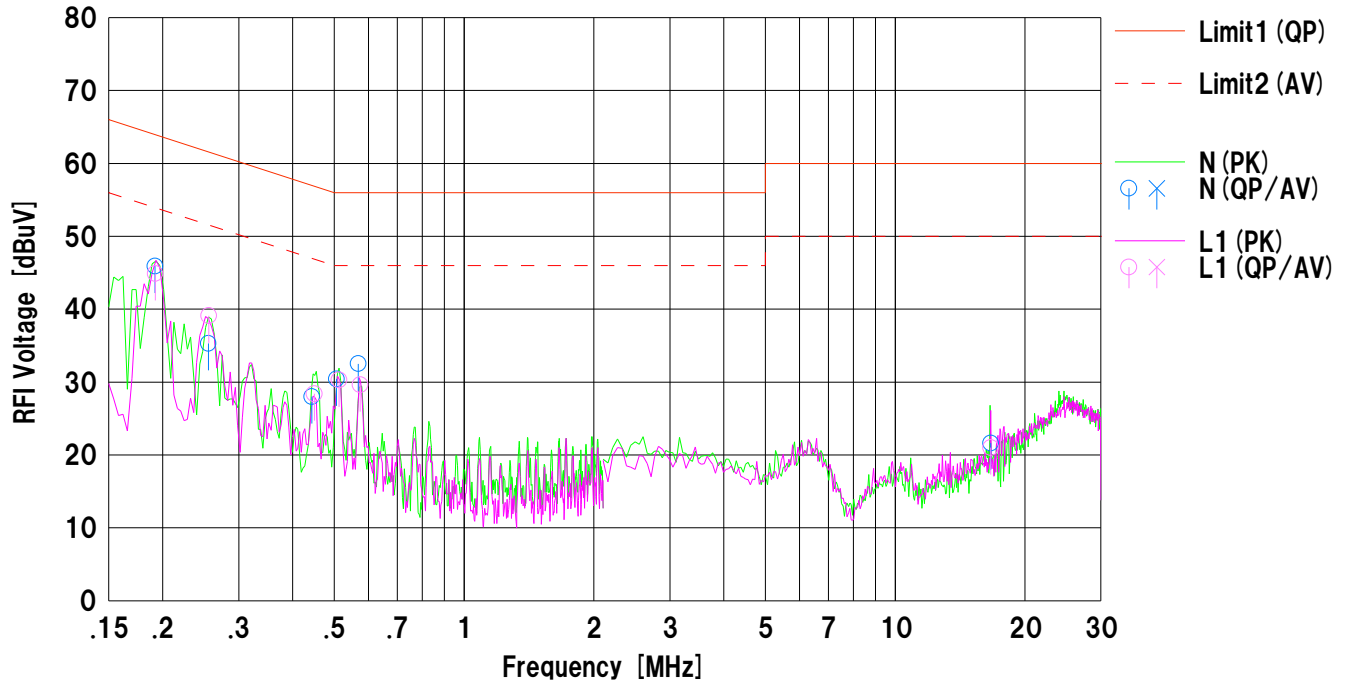
Company : RICOH COMPANY LTD.
Kind of E.U.T. : Wireless LAN Module
Model No. : TDPWLAN02
Serial No. : PJ2b-WLAN01

Mode : 11b:Tx (2437MHz)
Report No : 31AE0180-SH-01-A
Power : AC120V/60Hz SinglePhase without PE
Temp./Humi. : 20°C / 41%

Remarks : -

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Takahiro Suzuki



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.19195	33.3	---	12.6	45.9	---	63.9	53.9	18.0	---	N	
2	0.25500	22.7	---	12.6	35.3	---	61.5	51.5	26.2	---	N	
3	0.44348	15.4	---	12.6	28.0	---	56.9	46.9	28.9	---	N	
4	0.50619	17.8	---	12.6	30.4	---	56.0	46.0	25.6	---	N	
5	0.56849	19.9	---	12.6	32.5	---	56.0	46.0	23.5	---	N	
6	16.66380	8.3	---	13.3	21.6	---	60.0	50.0	38.4	---	N	
7	0.19210	32.3	---	12.6	44.9	---	63.9	53.9	19.0	---	L1	
8	0.25574	26.5	---	12.6	39.1	---	61.5	51.5	22.4	---	L1	
9	0.44919	15.8	---	12.6	28.4	---	56.8	46.8	28.4	---	L1	
10	0.51312	17.7	---	12.6	30.3	---	56.0	46.0	25.7	---	L1	
11	0.57371	17.0	---	12.6	29.6	---	56.0	46.0	26.4	---	L1	
12	16.66380	7.7	---	13.3	21.0	---	60.0	50.0	39.0	---	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+Att) [dB]

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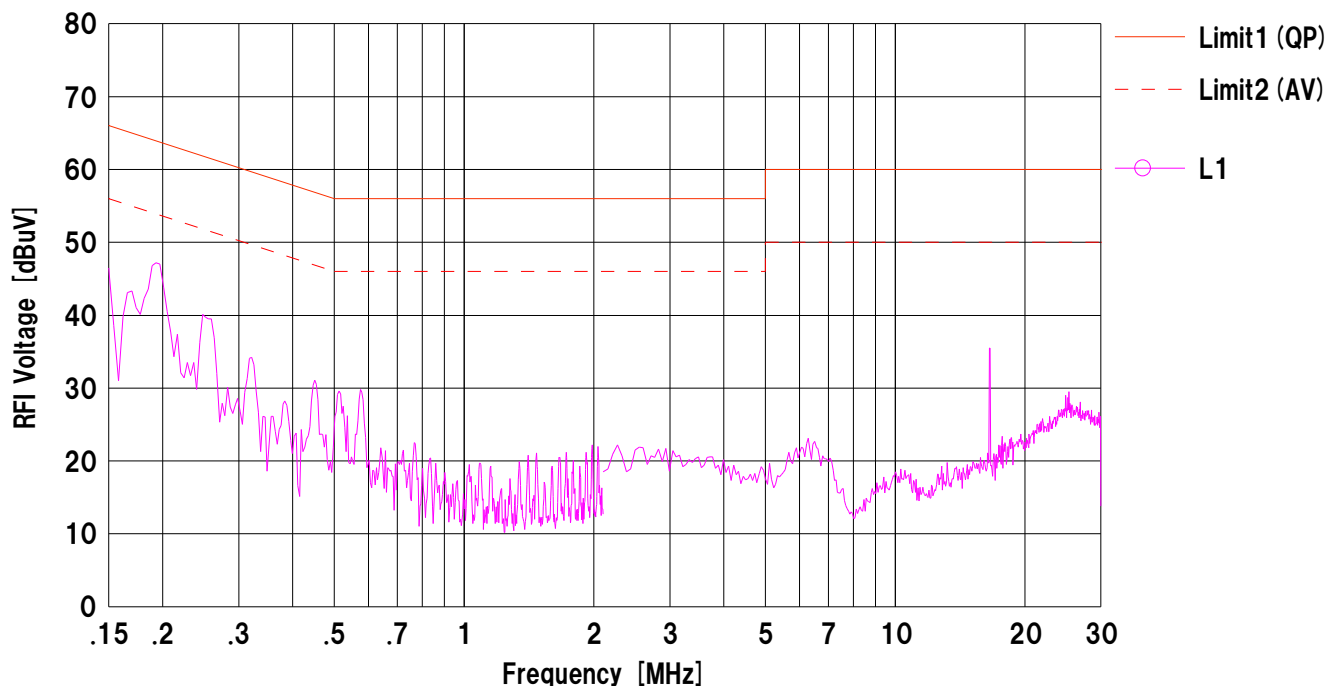
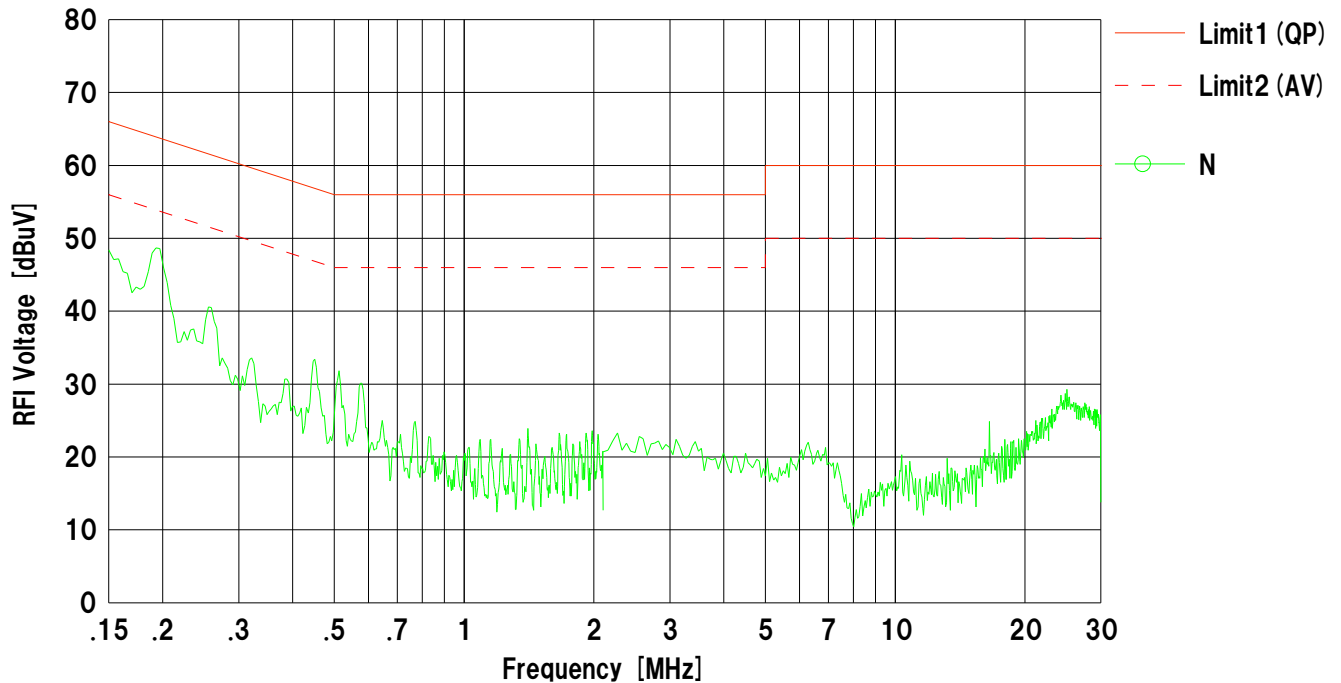
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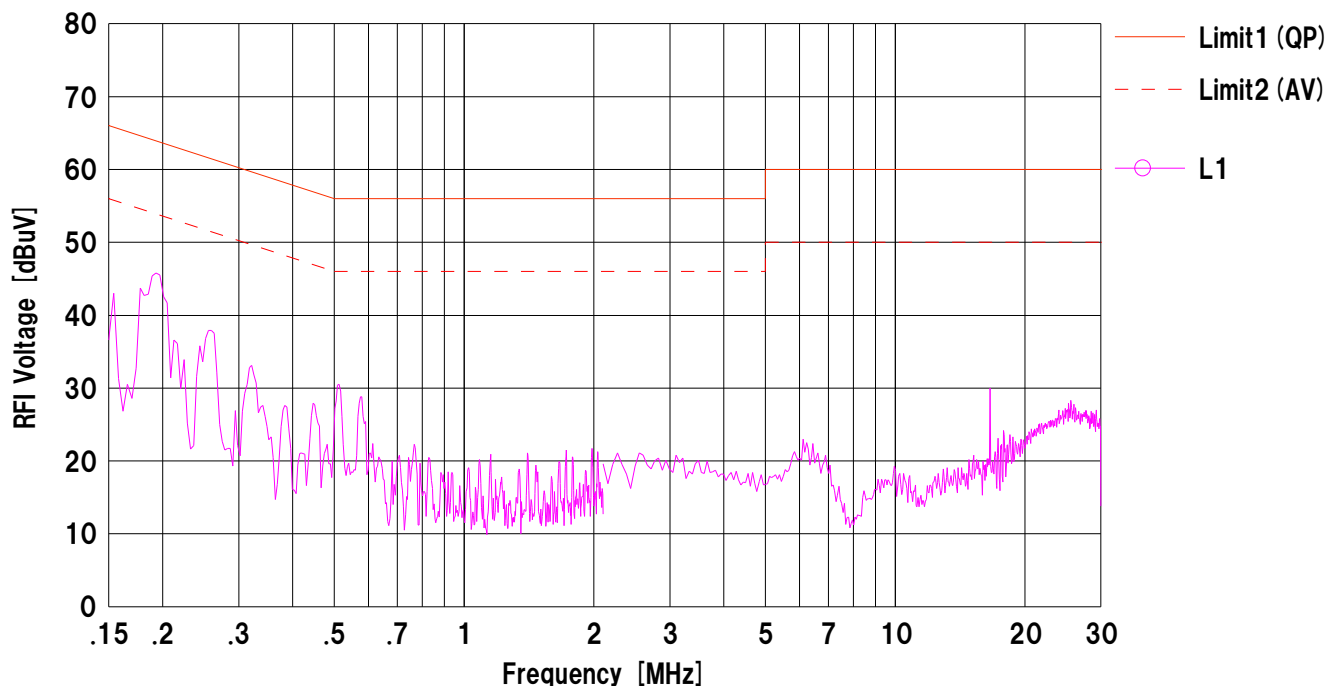
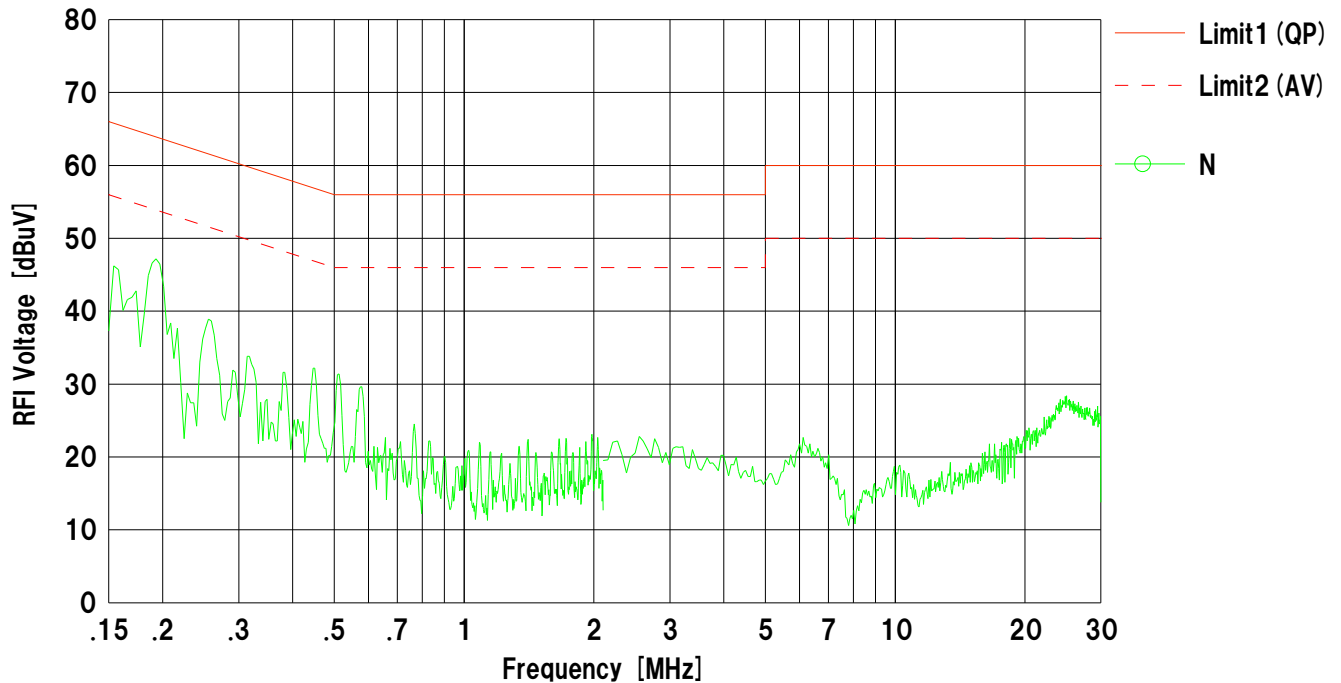
Company : RICOH COMPANY LTD.
Kind of E.U.T. : Wireless LAN Module
Model No. : TDPWLAN02
Serial No. : PJ2b-WLAN01

Mode : 11b:Tx (2462MHz)
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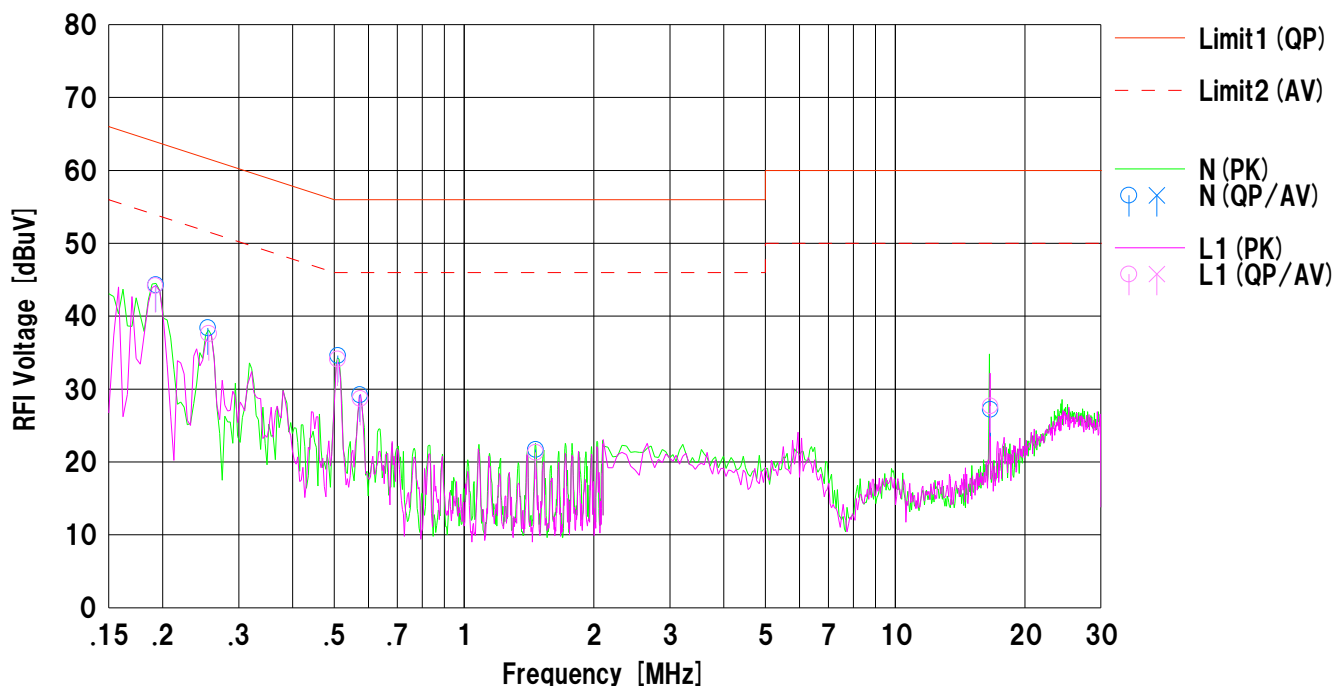
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Engineer : Takahiro Suzuki



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.19245	31.7	---	12.6	44.3	---	63.9	53.9	19.6	---	N	
2	0.25460	25.8	---	12.6	38.4	---	61.6	51.6	23.2	---	N	
3	0.50930	22.0	---	12.6	34.6	---	56.0	46.0	21.4	---	N	
4	0.57360	16.6	---	12.6	29.2	---	56.0	46.0	26.8	---	N	
5	1.46430	9.1	---	12.6	21.7	---	56.0	46.0	34.3	---	N	
6	16.61733	13.9	---	13.3	27.2	---	60.0	50.0	32.8	---	N	
7	0.19200	31.6	---	12.6	44.2	---	63.9	53.9	19.7	---	L1	
8	0.25560	25.0	---	12.6	37.6	---	61.5	51.5	23.9	---	L1	
9	0.50880	21.5	---	12.6	34.1	---	56.0	46.0	21.9	---	L1	
10	0.57440	16.1	---	12.6	28.7	---	56.0	46.0	27.3	---	L1	
11	1.46430	8.7	---	12.6	21.3	---	56.0	46.0	34.7	---	L1	
12	16.61733	14.4	---	13.3	27.7	---	60.0	50.0	32.3	---	L1	

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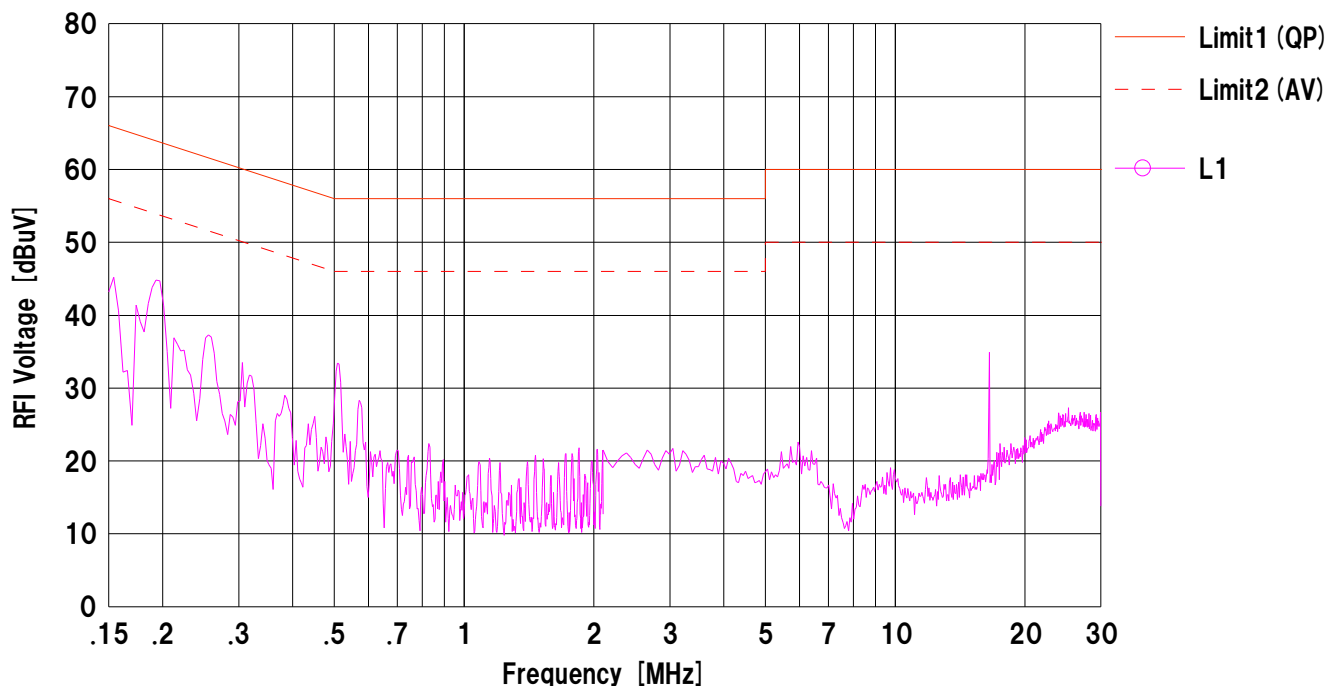
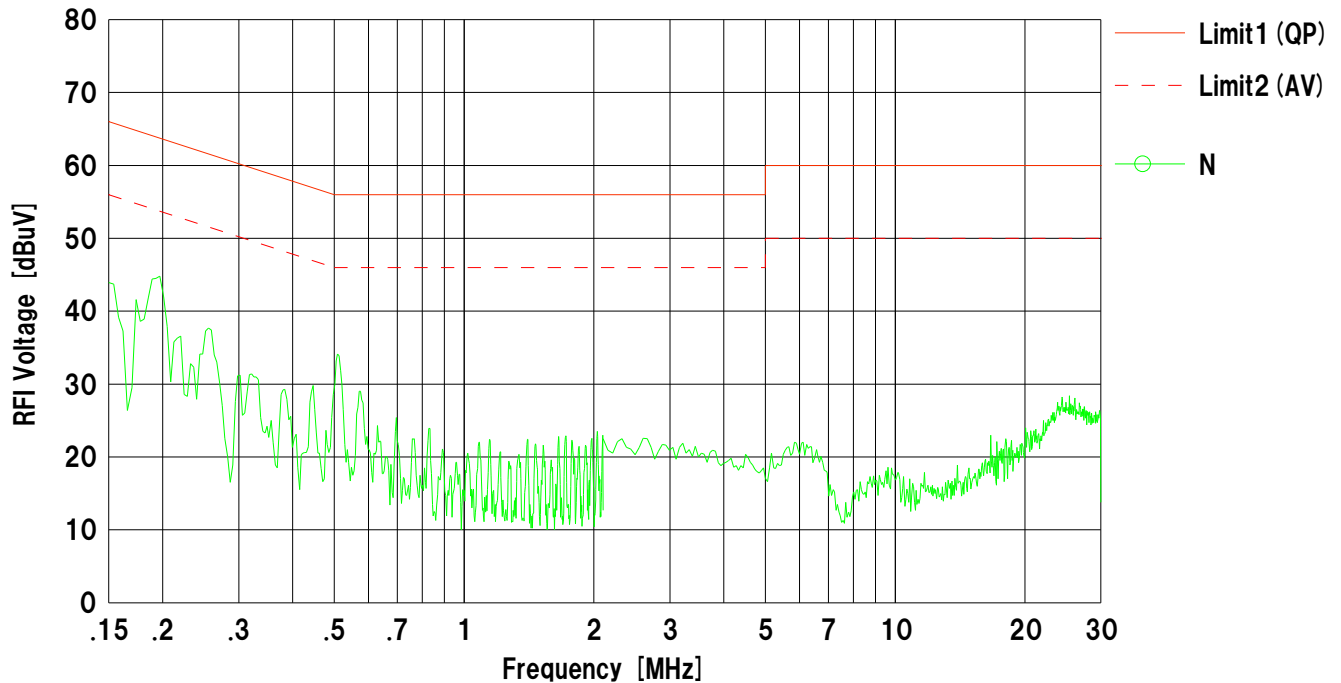
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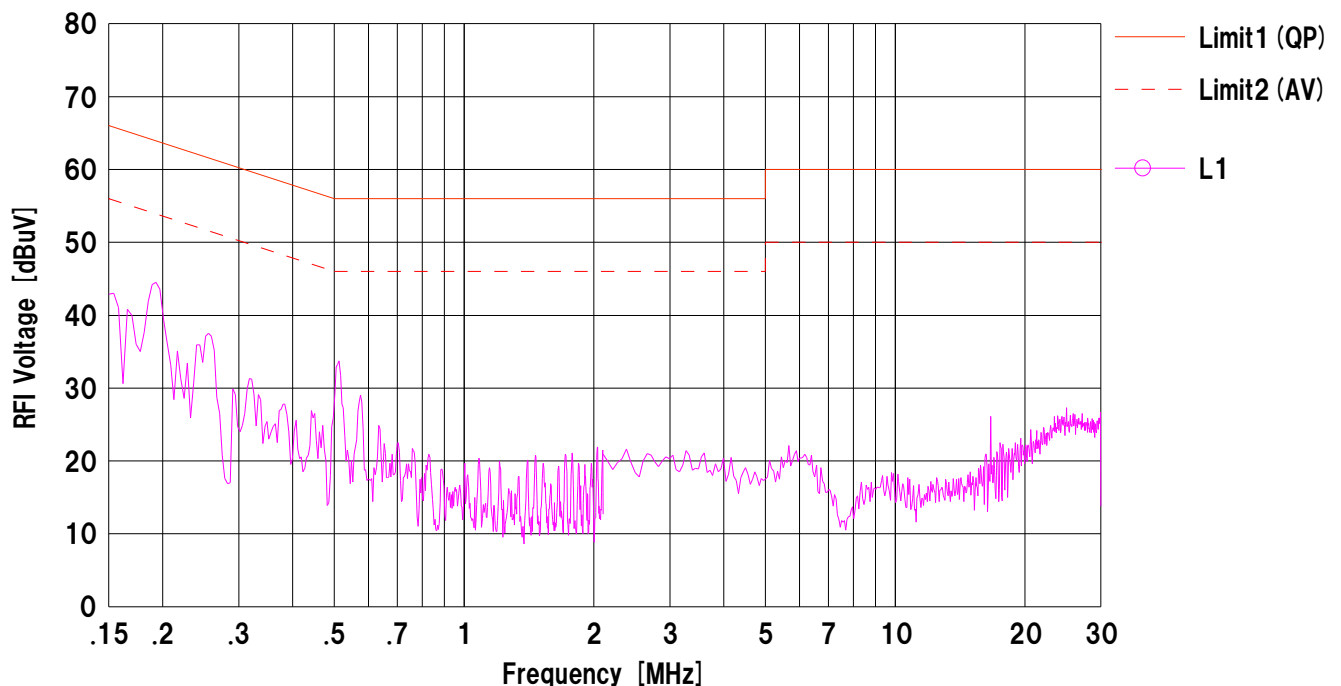
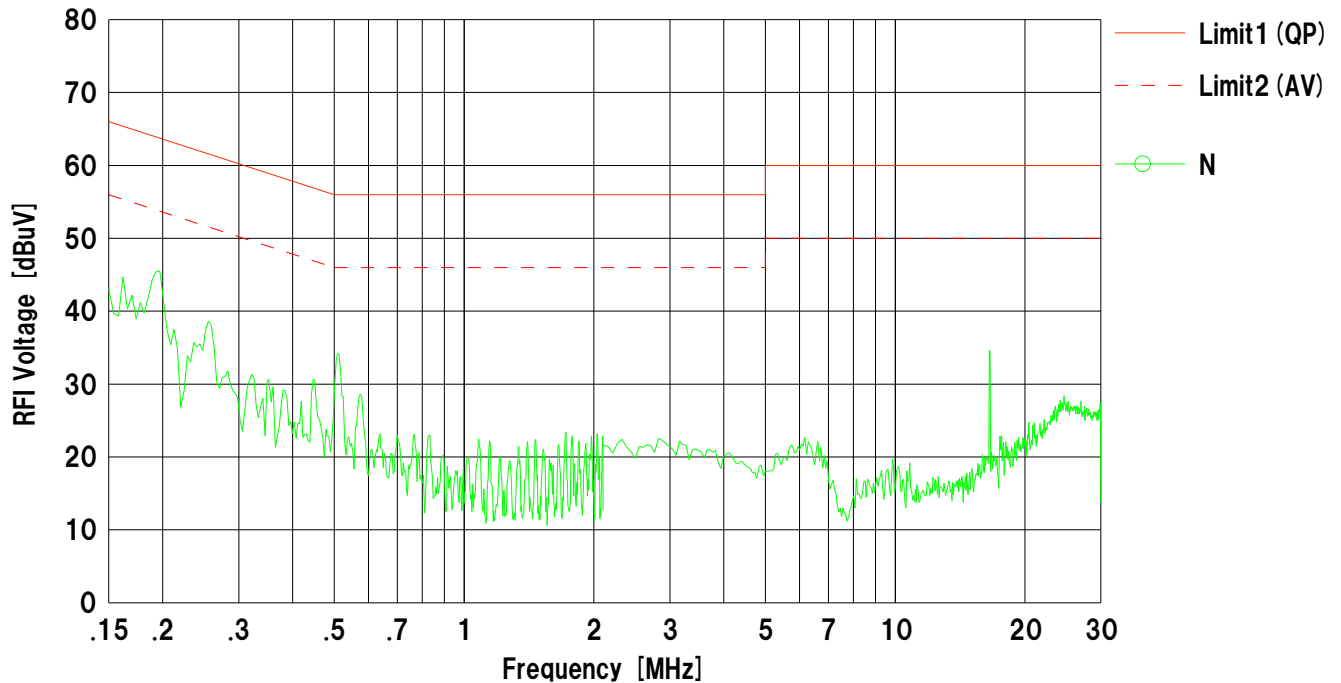
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Engineer : Takahiro Suzuki

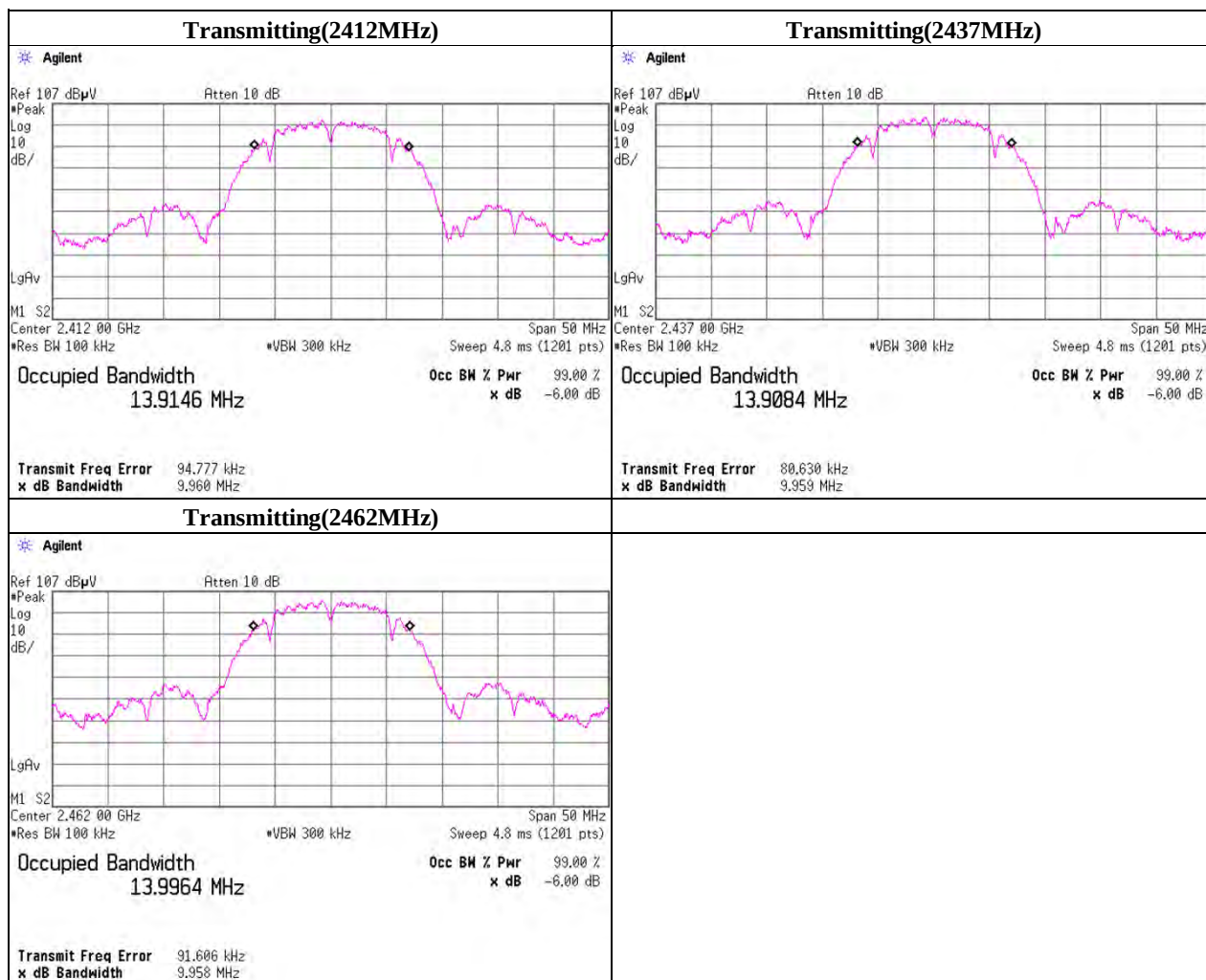


Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+Att) [dB]

-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2010/12/21	
Temperature / Humidity	26deg.C. / 32%	
Engineer	Tatsuya Arai	
Mode	Tx, IEEE802.11b, 2Mbps, PN9,	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	9.960	> 0.500
2437.0000	9.959	> 0.500
2462.0000	9.958	> 0.500

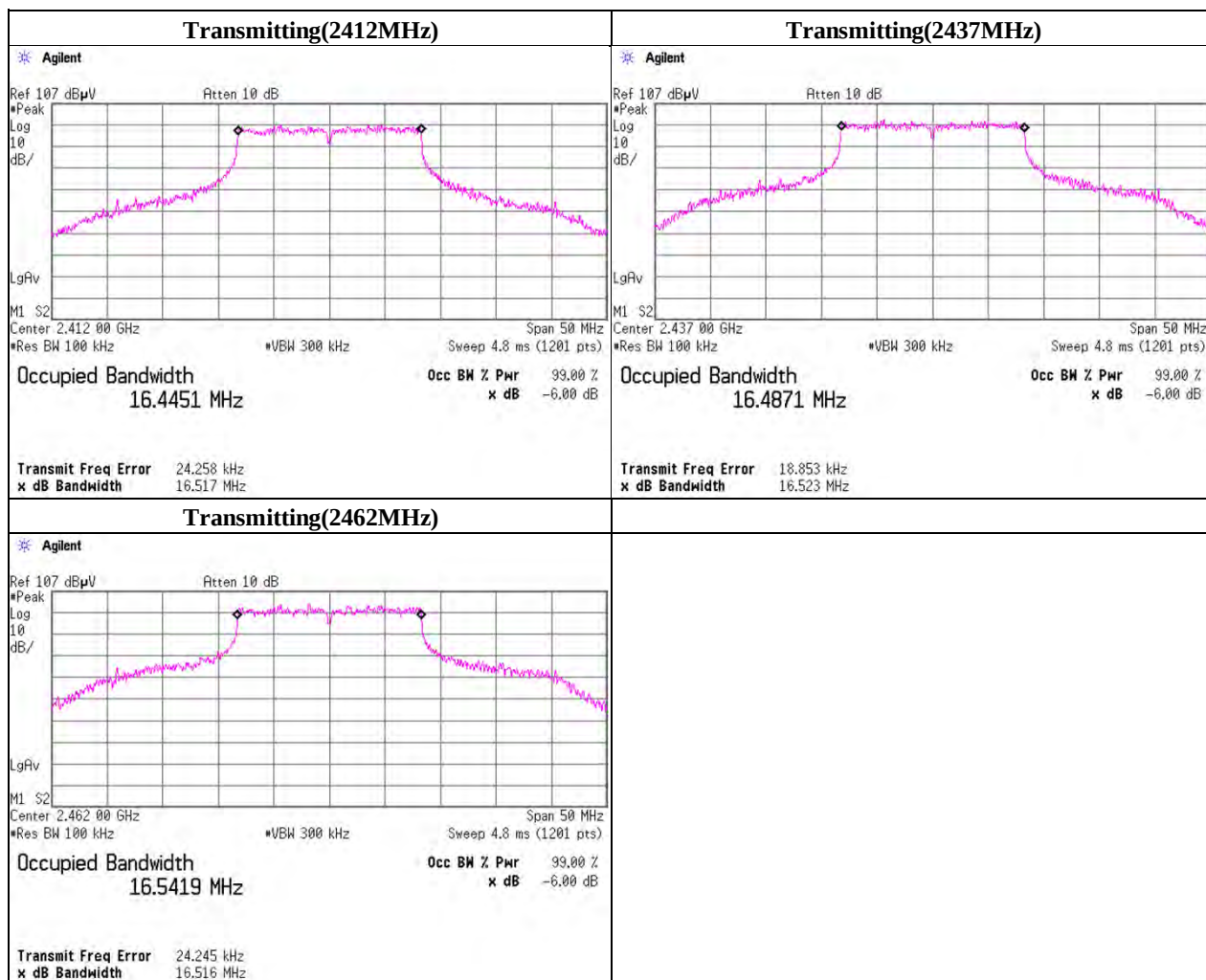


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 Facsimile : +81 463 50 6401

-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	2010/12/21	
Temperature / Humidity	26deg.C. / 32%	
Engineer	Tatsuya Arai	
Mode	Tx, IEEE802.11g, 48Mbps, PN9,	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	16.517	> 0.500
2437.0000	16.523	> 0.500
2462.0000	16.516	> 0.500



Peak Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date 2011/1/19
Temperature / Humidity 24deg.C. , 22%
Engineer Shinichi Takano
Mode Tx, IEEE802.11b, 2Mbps, PN9,

Ch	Freq. [MHz]	P/M (PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2412.0	5.43	2.08	9.57	17.08	51.04	30.00	1000	12.92
Mid	2437.0	6.63	2.08	9.57	18.28	67.34	30.00	1000	11.72
High	2462.0	8.01	2.08	9.57	19.67	92.59	30.00	1000	10.33

Sample Calculation:

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

* In the above table, factor 0.0dB represents no use of Atten. and/or Filter.

*The test result is rounded off to one or two decimal places, so some differences might be observed.

[Pre check]

Data Rate [Mbps]	Freq. [MHz]	P/M (PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
1	2437.0	6.61	2.08	9.57	18.26	67.03	30.00	1000	11.74
2	2437.0	6.63	2.08	9.57	18.28	67.34	30.00	1000	11.72
5.5	2437.0	6.25	2.08	9.57	17.90	61.69	30.00	1000	12.10
11	2437.0	6.53	2.08	9.57	18.18	65.80	30.00	1000	11.82

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Peak Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date 2011/1/19
Temperature / Humidity 24deg.C. , 22%
Engineer Shinichi Takano
Mode Tx, IEEE802.11g, 48Mbps, PN9,

Ch	Freq.	P/M (PK) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2412.0	10.38	2.08	9.57	22.03	159.57	30.00	1000	7.97
Mid	2437.0	10.95	2.08	9.57	22.60	182.07	30.00	1000	7.40
High	2462.0	11.65	2.08	9.57	23.31	214.06	30.00	1000	6.69

Sample Calculation:

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

* In the above table, factor 0.0dB represents no use of Atten. and/or Filter.

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[Pre check]

Data Rate	Freq.	P/M (PK) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[Mbps]	[MHz]	[dBm]	[dB]	[dB]	[mW]	[dBm]	[mW]	[dB]
6	2437.0	10.86	2.08	9.57	22.51	178.34	30.00	1000	7.49
9	2437.0	10.83	2.08	9.57	22.48	177.11	30.00	1000	7.52
12	2437.0	10.73	2.08	9.57	22.38	173.08	30.00	1000	7.62
18	2437.0	10.71	2.08	9.57	22.36	172.28	30.00	1000	7.64
24	2437.0	10.92	2.08	9.57	22.57	180.82	30.00	1000	7.43
36	2437.0	10.84	2.08	9.57	22.49	177.52	30.00	1000	7.51
48	2437.0	10.95	2.08	9.57	22.60	182.07	30.00	1000	7.40
54	2437.0	10.83	2.08	9.57	22.48	177.11	30.00	1000	7.52

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date 2010/12/22 2011/1/16 2011/1/20
 Temperature / Humidity 26deg.C. , 40% 21deg.C. , 23% 23deg.C. , 24%
 Engineer Wataru Kojima Shinichi Takano Shinichi Takano
 Mode Tx, 2412 MHz
 IEEE802.11b, 2Mbps, PN9,

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.	183.207	QP	39.7	16.3	8.7	31.7	33.0	43.5	10.5	171	302	
Hori.	215.466	QP	41.0	16.8	9.0	31.7	35.1	43.5	8.4	152	288	
Hori.	316.452	QP	46.1	14.4	6.5	31.6	35.4	46.0	10.6	100	233	
Hori.	381.116	QP	49.2	16.0	7.0	31.6	40.6	46.0	5.4	100	28	
Hori.	397.614	QP	48.3	16.5	7.1	31.6	40.3	46.0	5.7	100	243	
Hori.	430.792	QP	47.3	17.0	7.3	31.6	40.0	46.0	6.0	100	241	
Hori.	2366.362	PK	21.6	27.0	3.3	0.0	51.9	73.9	22.0	100	320	
Hori.	2390.000	PK	22.9	27.1	3.3	0.0	53.3	73.9	20.6	100	320	
Hori.	4824.000	PK	47.3	30.9	5.6	40.1	43.7	73.9	30.2	100	0	
Hori.	7236.000	PK	47.1	36.1	6.8	39.0	51.0	73.9	22.9	100	0	
Hori.	9648.000	PK	45.1	38.3	7.9	38.9	52.4	73.9	21.5	100	0	
Hori.	12060.000	PK	45.0	39.1	9.2	38.7	54.6	73.9	19.3	100	0	
Hori.	19296.000	PK	60.9	40.1	-2.9	47.5	50.6	73.9	23.4	111	39	
Hori.	2366.362	AV	10.6	27.0	3.3	0.0	40.9	53.9	13.0	100	320	VBW=10Hz
Hori.	2390.000	AV	9.8	27.1	3.3	0.0	40.2	53.9	13.7	100	320	VBW=10Hz
Hori.	4824.000	AV	35.2	30.9	5.6	40.1	31.6	53.9	22.3	100	0	VBW=10Hz
Hori.	7236.000	AV	35.2	36.1	6.8	39.0	39.1	53.9	14.8	100	0	VBW=10Hz
Hori.	9648.000	AV	33.1	38.3	7.9	38.9	40.4	53.9	13.5	100	0	VBW=10Hz
Hori.	12060.000	AV	33.7	39.1	9.2	38.7	43.3	53.9	10.6	100	0	VBW=10Hz
Hori.	19296.000	AV	58.3	40.1	-2.9	47.5	48.0	53.9	6.0	111	39	VBW=10Hz
Vert.	498.720	QP	40.8	18.0	7.7	31.6	34.9	46.0	11.1	125	23	
Vert.	2367.035	PK	21.7	27.0	3.3	0.0	52.0	73.9	21.9	100	245	
Vert.	2390.000	PK	21.7	27.1	3.3	0.0	52.1	73.9	21.8	100	245	
Vert.	4824.000	PK	47.2	30.9	5.6	40.1	43.6	73.9	30.3	100	0	
Vert.	7236.000	PK	47.1	36.1	6.8	39.0	51.0	73.9	22.9	100	0	
Vert.	9648.000	PK	45.4	38.3	7.9	38.9	52.7	73.9	21.2	100	0	
Vert.	12060.000	PK	45.7	39.1	9.2	38.7	55.3	73.9	18.6	100	0	
Vert.	19296.000	PK	61.7	40.1	-2.9	47.5	51.4	73.9	22.6	100	46	
Vert.	2367.035	AV	10.4	27.0	3.3	0.0	40.7	53.9	13.2	100	245	VBW=10Hz
Vert.	2390.000	AV	9.8	27.1	3.3	0.0	40.2	53.9	13.7	100	245	VBW=10Hz
Vert.	4824.000	AV	35.6	30.9	5.6	40.1	32.0	53.9	21.9	100	0	VBW=10Hz
Vert.	7236.000	AV	35.8	36.1	6.8	39.0	39.7	53.9	14.2	100	0	VBW=10Hz
Vert.	9648.000	AV	33.9	38.3	7.9	38.9	41.2	53.9	12.7	100	0	VBW=10Hz
Vert.	12060.000	AV	33.8	39.1	9.2	38.7	43.4	53.9	10.5	100	0	VBW=10Hz
Vert.	19296.000	AV	59.5	40.1	-2.9	47.5	49.2	53.9	4.8	100	46	VBW=10Hz

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-40GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	62.9	27.1	3.5	0.0	93.5	-	-	Carrier
Hori.	2397.170	PK	14.3	27.1	3.3	0.0	44.7	73.5	28.8	
Hori.	2400.000	PK	14.7	27.1	3.5	0.0	45.3	73.5	28.2	
Vert.	2412.000	PK	63.6	27.1	3.5	0.0	94.2	-	-	Carrier
Vert.	2397.170	PK	13.8	27.1	3.3	0.0	44.2	74.2	30.0	
Vert.	2400.000	PK	15.4	27.1	3.5	0.0	46.0	74.2	28.2	

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

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 Date 2010/12/22 2011/1/16 2011/1/20
 Temperature / Humidity 26deg.C. , 40% 21deg.C. , 23% 23deg.C. , 24%
 Engineer Wataru Kojima Shinichi Takano Shinichi Takano
 Mode Tx, 2437 MHz
 IEEE802.11b, 2Mbps, PN9,

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.	183.173	QP	39.5	16.3	8.7	31.7	32.8	43.5	10.7	180	305	
Hori.	215.454	QP	40.8	16.8	9.0	31.7	34.9	43.5	8.6	156	307	
Hori.	316.484	QP	45.2	14.4	6.5	31.6	34.5	46.0	11.5	100	242	
Hori.	382.969	QP	49.3	16.1	7.0	31.6	40.8	46.0	5.2	100	19	
Hori.	399.767	QP	47.8	16.5	7.1	31.6	39.8	46.0	6.2	100	249	
Hori.	433.164	QP	47.0	17.0	7.3	31.6	39.7	46.0	6.3	100	252	
Hori.	4874.000	PK	47.1	31.1	5.6	40.1	43.7	73.9	30.2	100	0	
Hori.	7311.000	PK	47.1	36.2	6.9	39.0	51.2	73.9	22.7	100	0	
Hori.	9748.000	PK	46.1	38.4	8.0	39.0	53.5	73.9	20.4	100	0	
Hori.	12185.000	PK	44.1	39.2	9.2	38.7	53.8	73.9	20.1	100	0	
Hori.	19496.000	PK	60.7	40.1	-2.9	47.4	50.5	73.9	23.5	110	39	
Hori.	4874.000	AV	35.5	31.1	5.6	40.1	32.1	53.9	21.8	100	0	VBW=10Hz
Hori.	7311.000	AV	35.3	36.2	6.9	39.0	39.4	53.9	14.5	100	0	VBW=10Hz
Hori.	9748.000	AV	34.0	38.4	8.0	39.0	41.4	53.9	12.5	100	0	VBW=10Hz
Hori.	12185.000	AV	33.2	39.2	9.2	38.7	42.9	53.9	11.0	100	0	VBW=10Hz
Hori.	19496.000	AV	58.2	40.1	-2.9	47.4	48.0	53.9	6.0	110	39	VBW=10Hz
Vert.	499.910	QP	42.0	18.0	7.7	31.6	36.1	46.0	9.9	124	37	
Vert.	4874.000	PK	46.7	31.1	5.6	40.1	43.3	73.9	30.6	100	0	
Vert.	7311.000	PK	46.7	36.2	6.9	39.0	50.8	73.9	23.1	100	0	
Vert.	9748.000	PK	45.4	38.4	8.0	39.0	52.8	73.9	21.1	100	0	
Vert.	12185.000	PK	45.2	39.2	9.2	38.7	54.9	73.9	19.0	100	0	
Vert.	19496.000	PK	60.2	40.1	-2.9	47.4	50.0	73.9	24.0	100	46	
Vert.	4874.000	AV	35.5	31.1	5.6	40.1	32.1	53.9	21.8	100	0	VBW=10Hz
Vert.	7311.000	AV	35.2	36.2	6.9	39.0	39.3	53.9	14.6	100	0	VBW=10Hz
Vert.	9748.000	AV	33.9	38.4	8.0	39.0	41.3	53.9	12.6	100	0	VBW=10Hz
Vert.	12185.000	AV	33.1	39.2	9.2	38.7	42.8	53.9	11.1	100	0	VBW=10Hz
Vert.	19496.000	AV	59.1	40.1	-2.9	47.4	48.9	53.9	5.1	100	46	VBW=10Hz

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-40GHz 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date 2010/12/22 2011/1/16 2011/1/20
Temperature / Humidity 26deg.C. , 40% 21deg.C. , 23% 23deg.C. , 24%
Engineer Wataru Kojima Shinichi Takano Shinichi Takano
Mode Tx, 2462 MHz
 IEEE802.11b, 2Mbps, PN9,

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.	183.126	QP	39.6	16.3	8.7	31.7	32.9	43.5	10.6	193	292	
Hori.	215.485	QP	41.3	16.8	9.0	31.7	35.4	43.5	8.1	155	297	
Hori.	316.455	QP	45.9	14.4	6.5	31.6	35.2	46.0	10.8	100	236	
Hori.	383.134	QP	48.7	16.1	7.0	31.6	40.2	46.0	5.8	100	17	
Hori.	399.751	QP	48.2	16.5	7.1	31.6	40.2	46.0	5.8	100	248	
Hori.	432.893	QP	47.8	17.0	7.3	31.6	40.5	46.0	5.5	100	259	
Hori.	2483.500	PK	25.5	27.1	3.5	0.0	56.1	73.9	17.8	175	320	
Hori.	2505.250	PK	24.2	27.1	3.5	0.0	54.8	73.9	19.1	175	320	
Hori.	4924.000	PK	48.6	31.2	5.6	40.0	45.4	73.9	28.5	119	147	
Hori.	7386.000	PK	47.2	36.4	6.8	39.1	51.3	73.9	22.6	100	0	
Hori.	9848.000	PK	45.8	38.4	8.1	39.2	53.1	73.9	20.8	100	0	
Hori.	12310.000	PK	44.7	39.2	9.3	38.6	54.6	73.9	19.3	100	0	
Hori.	19696.000	PK	58.5	40.2	-2.9	47.4	48.4	73.9	25.6	110	39	
Hori.	2483.500	AV	11.9	27.1	3.5	0.0	42.5	53.9	11.4	175	320	VBW=10Hz
Hori.	2505.250	AV	12.5	27.1	3.5	0.0	43.1	53.9	10.8	175	320	VBW=10Hz
Hori.	4924.000	AV	39.0	31.2	5.6	40.0	35.8	53.9	18.1	119	147	VBW=10Hz
Hori.	7386.000	AV	35.5	36.4	6.8	39.1	39.6	53.9	14.3	100	0	VBW=10Hz
Hori.	9848.000	AV	34.2	38.4	8.1	39.2	41.5	53.9	12.4	100	0	VBW=10Hz
Hori.	12310.000	AV	32.9	39.2	9.3	38.6	42.8	53.9	11.1	100	0	VBW=10Hz
Hori.	19696.000	AV	55.5	40.2	-2.9	47.4	45.4	53.9	8.6	110	39	VBW=10Hz
Vert.	498.930	QP	43.2	18.0	7.7	31.6	37.3	46.0	8.7	128	37	
Vert.	2483.500	PK	25.1	27.1	3.5	0.0	55.7	73.9	18.2	100	246	
Vert.	2505.250	PK	25.1	27.1	3.5	0.0	55.7	73.9	18.2	100	246	
Vert.	4924.000	PK	49.7	31.2	5.6	40.0	46.5	73.9	27.4	100	113	
Vert.	7386.000	PK	47.2	36.4	6.8	39.1	51.3	73.9	22.6	100	0	
Vert.	9848.000	PK	45.6	38.4	8.1	39.2	52.9	73.9	21.0	100	0	
Vert.	12310.000	PK	45.0	39.2	9.3	38.6	54.9	73.9	19.0	100	0	
Vert.	19696.000	PK	57.7	40.2	-2.9	47.4	47.6	73.9	26.4	100	46	
Vert.	2483.500	AV	12.4	27.1	3.5	0.0	43.0	53.9	10.9	100	246	VBW=10Hz
Vert.	2505.250	AV	13.7	27.1	3.5	0.0	44.3	53.9	9.6	100	246	VBW=10Hz
Vert.	4924.000	AV	41.2	31.2	5.6	40.0	38.0	53.9	15.9	100	113	VBW=10Hz
Vert.	7386.000	AV	35.7	36.4	6.8	39.1	39.8	53.9	14.1	100	0	VBW=10Hz
Vert.	9848.000	AV	34.3	38.4	8.1	39.2	41.6	53.9	12.3	100	0	VBW=10Hz
Vert.	12310.000	AV	33.0	39.2	9.3	38.6	42.9	53.9	11.0	100	0	VBW=10Hz
Vert.	19696.000	AV	56.0	40.2	-2.9	47.4	45.9	53.9	8.1	100	46	VBW=10Hz

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-40GHz 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date 2010/12/22 2011/1/16
 Temperature / Humidity 26deg.C. , 40% 21deg.C. , 23%
 Engineer Wataru Kojima Shinichi Takano
 Mode Tx, 2412 MHz
 IEEE802.11g, 48Mbps, PN9,

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.	215.474	QP	41.3	16.8	9.0	31.7	35.4	43.5	8.1	157	299	
Hori.	316.450	QP	45.8	14.4	6.5	31.6	35.1	46.0	10.9	100	230	
Hori.	383.088	QP	48.7	16.1	7.0	31.6	40.2	46.0	5.8	100	13	
Hori.	399.750	QP	48.3	16.5	7.1	31.6	40.3	46.0	5.7	100	248	
Hori.	433.054	QP	47.4	17.0	7.3	31.6	40.1	46.0	5.9	100	249	
Hori.	2390.000	PK	22.3	27.5	3.3	0.0	53.1	73.9	20.8	114	42	
Hori.	4824.000	PK	45.8	31.6	5.7	40.1	43.0	73.9	30.9	100	0	
Hori.	7236.000	PK	46.5	36.5	6.8	38.3	51.5	73.9	22.4	100	0	
Hori.	9648.000	PK	43.6	37.9	8.0	37.4	52.1	73.9	21.8	100	0	
Hori.	12060.000	PK	46.1	39.3	9.2	38.3	56.3	73.9	17.6	100	0	
Hori.	19296.000	PK	61.0	40.1	-2.9	47.5	50.7	73.9	23.3	111	32	
Hori.	2390.000	AV	10.1	27.5	3.3	0.0	40.9	53.9	13.0	114	42	VBW=10Hz
Hori.	4824.000	AV	34.7	31.6	5.7	40.1	31.9	53.9	22.0	100	0	VBW=10Hz
Hori.	7236.000	AV	34.8	36.5	6.8	38.3	39.8	53.9	14.1	100	0	VBW=10Hz
Hori.	9648.000	AV	32.4	37.9	8.0	37.4	40.9	53.9	13.0	100	0	VBW=10Hz
Hori.	12060.000	AV	34.4	39.3	9.2	38.3	44.6	53.9	9.3	100	0	VBW=10Hz
Hori.	19296.000	AV	58.8	40.1	-2.9	47.5	48.5	53.9	5.5	111	32	VBW=10Hz
Vert.	379.768	QP	46.0	16.0	7.0	31.6	37.4	46.0	8.6	142	41	
Vert.	498.470	QP	41.7	18.0	7.7	31.6	35.8	46.0	10.2	132	27	
Vert.	2390.000	PK	23.5	27.5	3.3	0.0	54.3	73.9	19.6	100	283	
Vert.	4824.000	PK	46.3	31.6	5.7	40.1	43.5	73.9	30.4	100	0	
Vert.	7236.000	PK	46.1	36.5	6.8	38.3	51.1	73.9	22.8	100	0	
Vert.	9648.000	PK	44.0	37.9	8.0	37.4	52.5	73.9	21.4	100	0	
Vert.	12060.000	PK	46.2	39.3	9.2	38.3	56.4	73.9	17.5	100	0	
Vert.	19296.000	PK	61.8	40.1	-2.9	47.5	51.5	73.9	22.5	100	45	
Vert.	2390.000	AV	10.1	27.5	3.3	0.0	40.9	53.9	13.0	100	283	VBW=10Hz
Vert.	4824.000	AV	34.7	31.6	5.7	40.1	31.9	53.9	22.0	100	0	VBW=10Hz
Vert.	7236.000	AV	34.3	36.5	6.8	38.3	39.3	53.9	14.6	100	0	VBW=10Hz
Vert.	9648.000	AV	32.9	37.9	8.0	37.4	41.4	53.9	12.5	100	0	VBW=10Hz
Vert.	12060.000	AV	34.4	39.3	9.2	38.3	44.6	53.9	9.3	100	0	VBW=10Hz
Vert.	19296.000	AV	59.2	40.1	-2.9	47.5	48.9	53.9	5.1	100	45	VBW=10Hz

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-40GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet (RBW 100kHz, VBW 300kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	61.7	27.6	3.3	0.0	92.6	-	-	Carrier
Hori.	2400.000	PK	24.4	27.5	3.3	0.0	55.2	72.6	17.4	
Vert.	2412.000	PK	62.3	27.6	3.3	0.0	93.2	-	-	Carrier
Vert.	2400.000	PK	26.1	27.5	3.3	0.0	56.9	73.2	16.3	

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

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date 2010/12/22 2011/1/16
Temperature / Humidity 26deg.C. , 40% 21deg.C. , 23%
Engineer Wataru Kojima Shinichi Takano
Mode Tx, 2437 MHz
 IEEE802.11g, 48Mbps, PN9,

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.	215.528	QP	41.1	16.8	9	31.7	35.2	43.5	8.3	160	286	
Hori.	316.444	QP	46.2	14.4	6.5	31.6	35.5	46	10.5	129	241	
Hori.	383.048	QP	48.9	16.1	7	31.6	40.4	46	5.6	100	10	
Hori.	399.735	QP	48.3	16.5	7.1	31.6	40.3	46	5.7	100	243	
Hori.	433.109	QP	47.6	17	7.3	31.6	40.3	46	5.7	100	253	
Hori.	4874.000	PK	45.2	31.7	5.7	40	42.6	73.9	31.3	100	0	
Hori.	7311.000	PK	45.1	36.7	6.9	38.5	50.2	73.9	23.7	100	0	
Hori.	9748.000	PK	44.1	38.1	8	37.4	52.8	73.9	21.1	100	0	
Hori.	12185.000	PK	44.5	39.2	9.2	38.2	54.7	73.9	19.2	100	0	
Hori.	19496.000	PK	61.5	40.1	-2.9	47.4	51.3	73.9	22.7	111	39	
Hori.	4874.000	AV	34.4	31.7	5.7	40	31.8	53.9	22.1	100	0	VBW=10Hz
Hori.	7311.000	AV	34.2	36.7	6.9	38.5	39.3	53.9	14.6	100	0	VBW=10Hz
Hori.	9748.000	AV	32.8	38.1	8	37.4	41.5	53.9	12.4	100	0	VBW=10Hz
Hori.	12185.000	AV	33.7	39.2	9.2	38.2	43.9	53.9	10.0	100	0	VBW=10Hz
Hori.	19496.000	AV	58.4	40.1	-2.9	47.4	48.2	53.9	5.8	111	39	VBW=10Hz
Vert.	497.980	QP	43.1	18	7.7	31.6	37.2	46	8.8	124	31	
Vert.	4874.000	PK	46.5	31.7	5.7	40	43.9	73.9	30.0	100	0	
Vert.	7311.000	PK	45.7	36.7	6.9	38.5	50.8	73.9	23.1	100	0	
Vert.	9748.000	PK	44.1	38.1	8	37.4	52.8	73.9	21.1	100	0	
Vert.	12185.000	PK	44.6	39.2	9.2	38.2	54.8	73.9	19.1	100	0	
Vert.	19496.000	PK	62	40.1	-2.9	47.4	51.8	73.9	22.2	100	45	
Vert.	4874.000	AV	34.4	31.7	5.7	40	31.8	53.9	22.1	100	0	VBW=10Hz
Vert.	7311.000	AV	34.2	36.7	6.9	38.5	39.3	53.9	14.6	100	0	VBW=10Hz
Vert.	9748.000	AV	32.9	38.1	8	37.4	41.6	53.9	12.3	100	0	VBW=10Hz
Vert.	12185.000	AV	33.4	39.2	9.2	38.2	43.6	53.9	10.3	100	0	VBW=10Hz
Vert.	19496.000	AV	59.5	40.1	-2.9	47.4	49.3	53.9	4.7	100	45	VBW=10Hz

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-40GHz 20log(3.0m/1.0m)= 9.5dB

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Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date 2010/12/22 2011/1/16
 Temperature / Humidity 26deg.C. , 40% 21deg.C. , 23%
 Engineer Wataru Kojima Shinichi Takano
 Mode Tx, 2462 MHz
 IEEE802.11g, 48Mbps, PN9,

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.	215.486	QP	41.1	16.8	9.0	31.7	35.2	43.5	8.3	160	286	
Hori.	316.493	QP	45.7	14.4	6.5	31.6	35.0	46.0	11.0	100	233	
Hori.	383.149	QP	48.6	16.1	7.0	31.6	40.1	46.0	5.9	100	8	
Hori.	399.843	QP	47.8	16.5	7.1	31.6	39.8	46.0	6.2	100	246	
Hori.	433.090	QP	47.9	17.0	7.3	31.6	40.6	46.0	5.4	100	257	
Hori.	2483.500	PK	27.9	27.6	3.4	0.0	58.9	73.9	15.0	114	42	
Hori.	4924.000	PK	46.2	31.8	5.7	40.0	43.7	73.9	30.2	104	181	
Hori.	7386.000	PK	46.1	36.8	6.8	38.6	51.1	73.9	22.8	100	0	
Hori.	9848.000	PK	43.9	38.3	8.1	37.5	52.8	73.9	21.1	100	0	
Hori.	12310.000	PK	45.1	39.2	9.3	38.0	55.6	73.9	18.3	100	0	
Hori.	19696.000	PK	59.7	40.2	-2.9	47.4	49.6	73.9	24.4	111	39	
Hori.	2483.500	AV	14.0	27.6	3.4	0.0	45.0	53.9	8.9	114	42	VBW=10Hz
Hori.	4924.000	AV	35.0	31.8	5.7	40.0	32.5	53.9	21.4	104	181	VBW=10Hz
Hori.	7386.000	AV	34.6	36.8	6.8	38.6	39.6	53.9	14.3	100	0	VBW=10Hz
Hori.	9848.000	AV	32.8	38.3	8.1	37.5	41.7	53.9	12.2	100	0	VBW=10Hz
Hori.	12310.000	AV	33.1	39.2	9.3	38.0	43.6	53.9	10.3	100	0	VBW=10Hz
Hori.	19696.000	AV	57.3	40.2	-2.9	47.4	47.2	53.9	6.8	111	39	VBW=10Hz
Vert.	499.140	QP	41.5	18.0	7.7	31.6	35.6	46.0	10.4	120	27	
Vert.	2483.500	PK	30.2	27.6	3.4	0.0	61.2	73.9	12.7	100	283	
Vert.	4924.000	PK	46.3	31.8	5.7	40.0	43.8	73.9	30.1	156	296	
Vert.	7386.000	PK	44.9	36.8	6.8	38.6	49.9	73.9	24.0	100	0	
Vert.	9848.000	PK	44.6	38.3	8.1	37.5	53.5	73.9	20.4	100	0	
Vert.	12310.000	PK	44.2	39.2	9.3	38.0	54.7	73.9	19.2	100	0	
Vert.	19696.000	PK	59.4	40.2	-2.9	47.4	49.3	73.9	24.7	100	46	
Vert.	2483.500	AV	15.3	27.6	3.4	0.0	46.3	53.9	7.6	100	283	VBW=10Hz
Vert.	4924.000	AV	35.3	31.8	5.7	40.0	32.8	53.9	21.1	156	296	VBW=10Hz
Vert.	7386.000	AV	34.6	36.8	6.8	38.6	39.6	53.9	14.3	100	0	VBW=10Hz
Vert.	9848.000	AV	32.7	38.3	8.1	37.5	41.6	53.9	12.3	100	0	VBW=10Hz
Vert.	12310.000	AV	33.1	39.2	9.3	38.0	43.6	53.9	10.3	100	0	VBW=10Hz
Vert.	19696.000	AV	57.0	40.2	-2.9	47.4	46.9	53.9	7.1	100	46	VBW=10Hz

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-40GHz 20log(3.0m/1.0m)= 9.5dB

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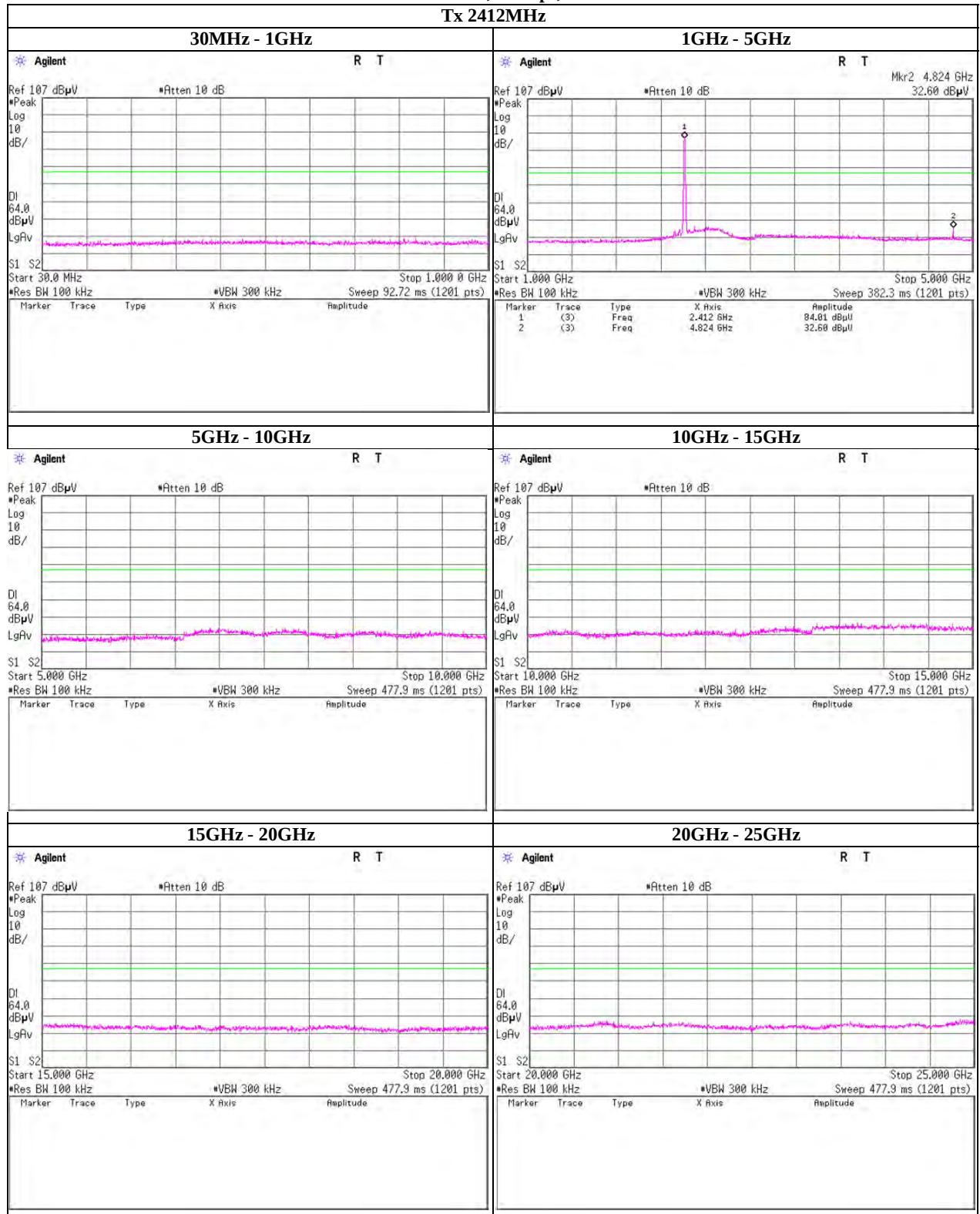
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

IEEE802.11b, 2Mbps, PN9



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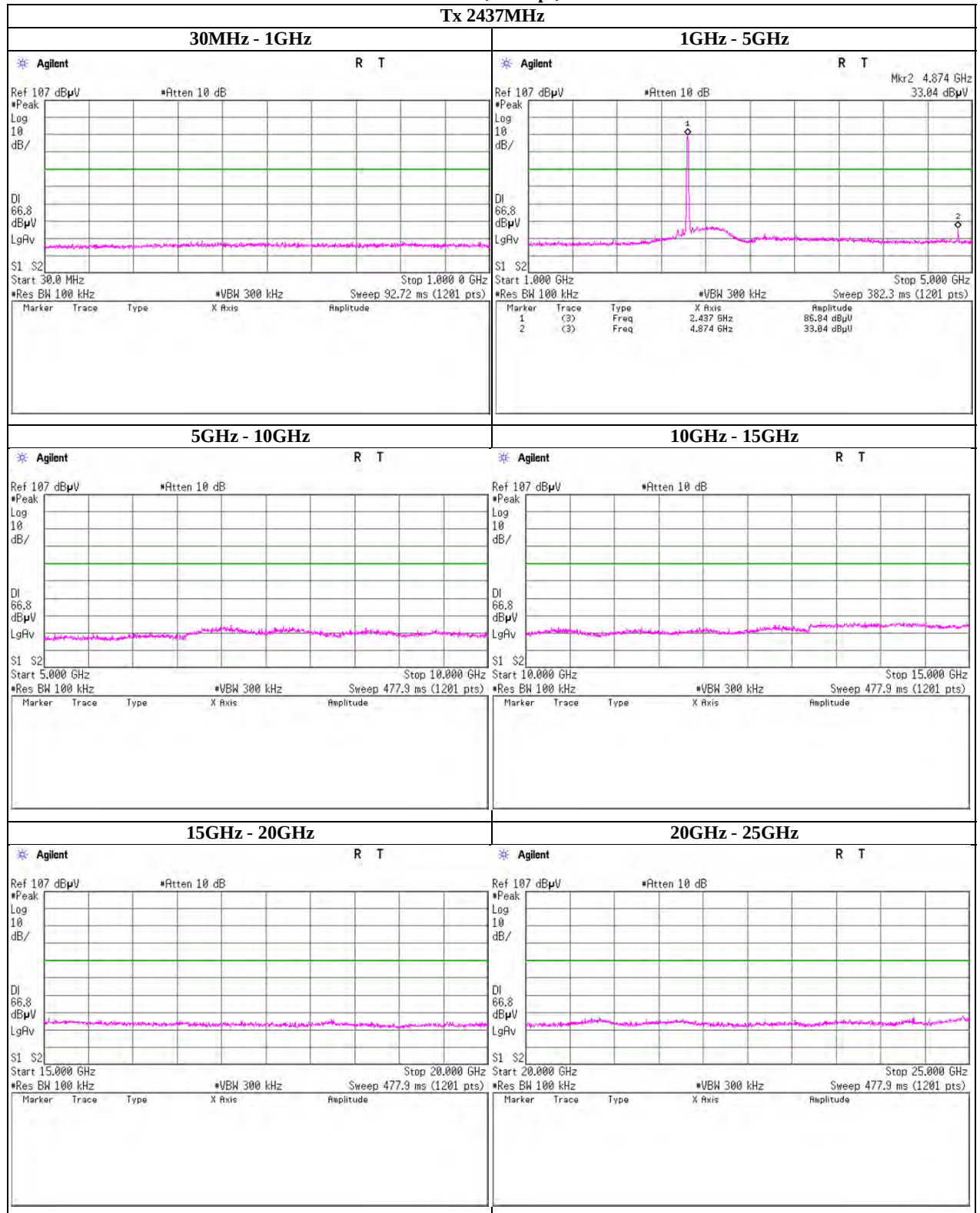
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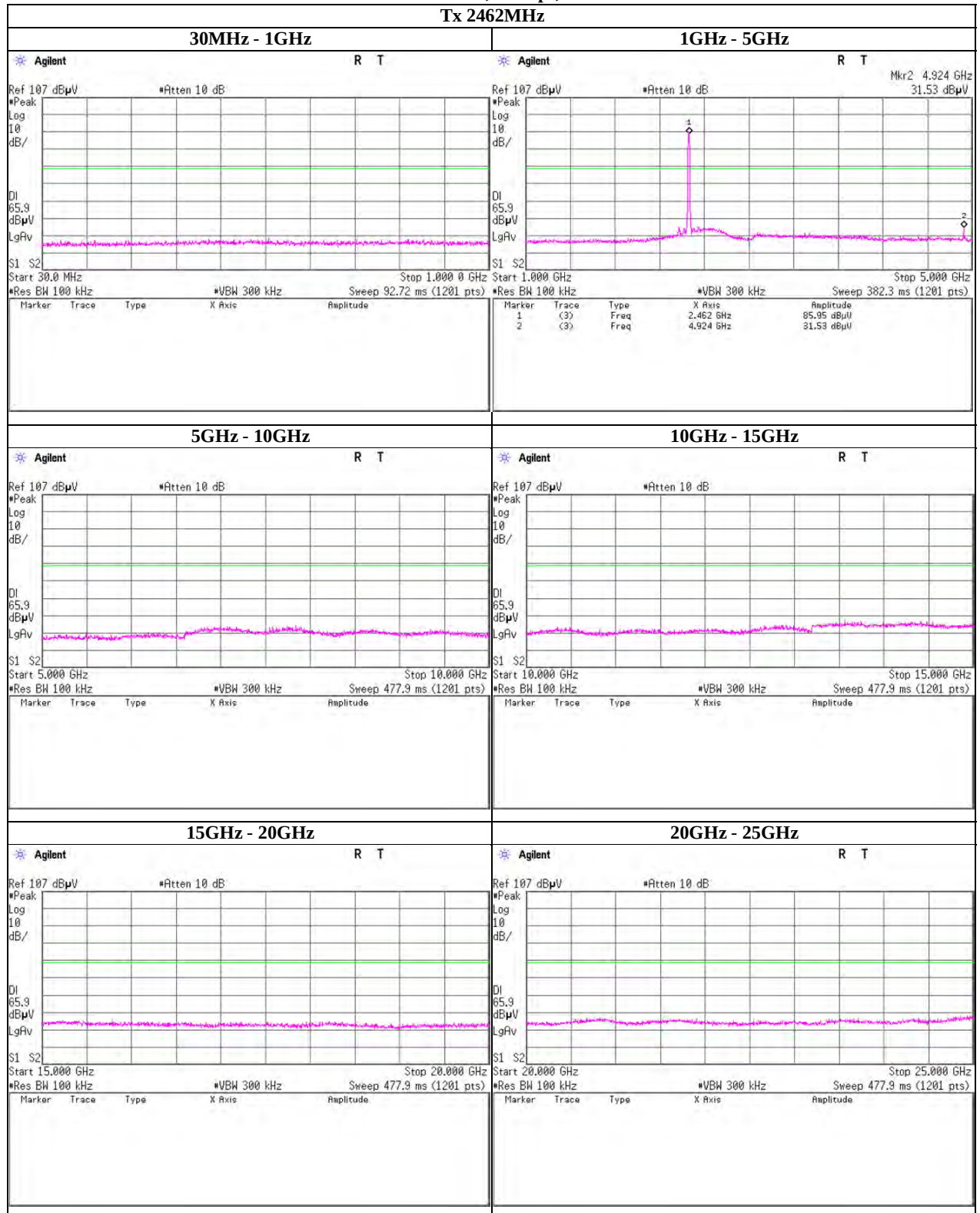
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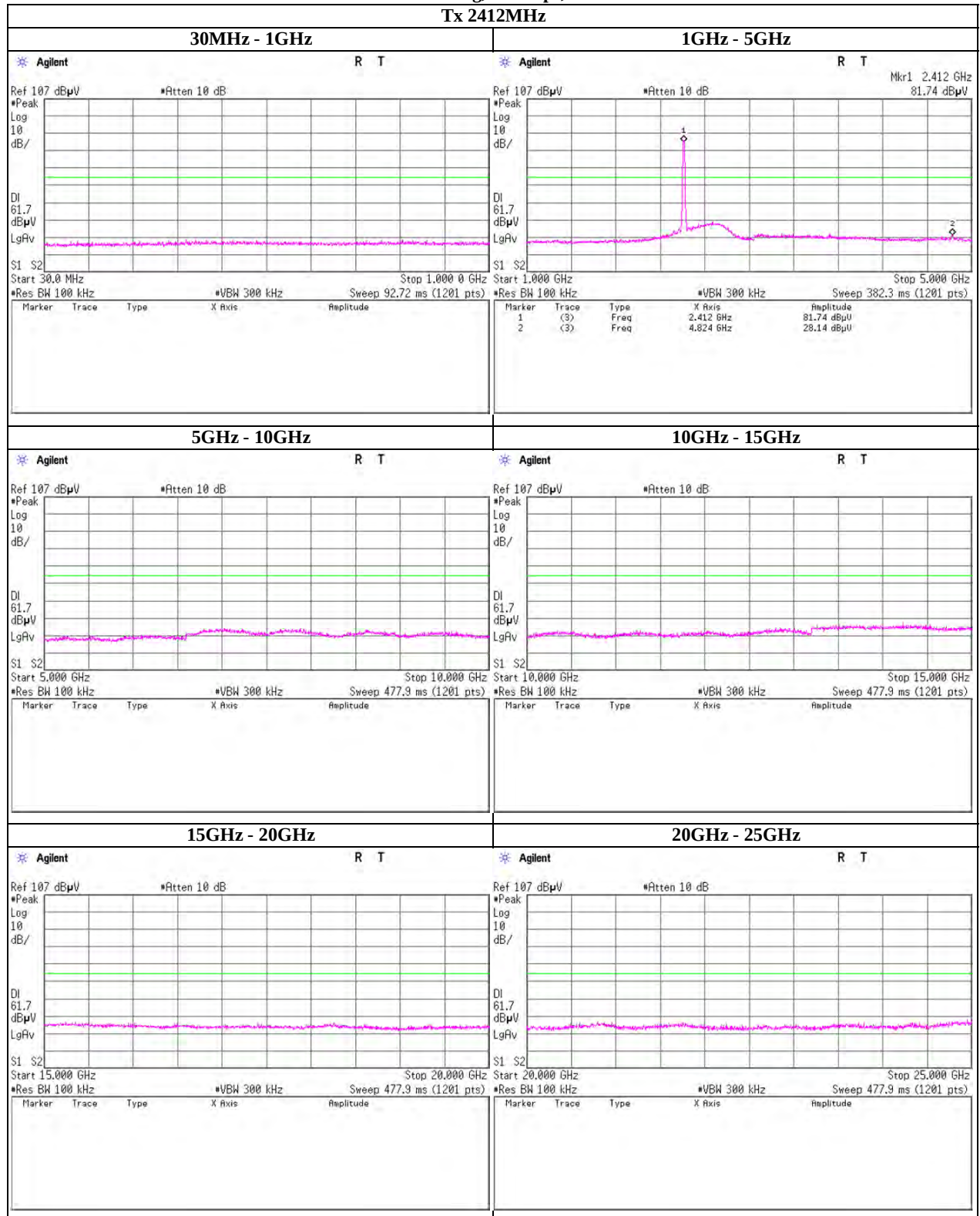
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Spurious emission (Conducted)

IEEE802.11g, 48Mbps, PN9



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Spurious emission (Conducted)

IEEE802.11g, 48Mbps, PN9



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Spurious emission (Conducted)

IEEE802.11g, 48Mbps, PN9



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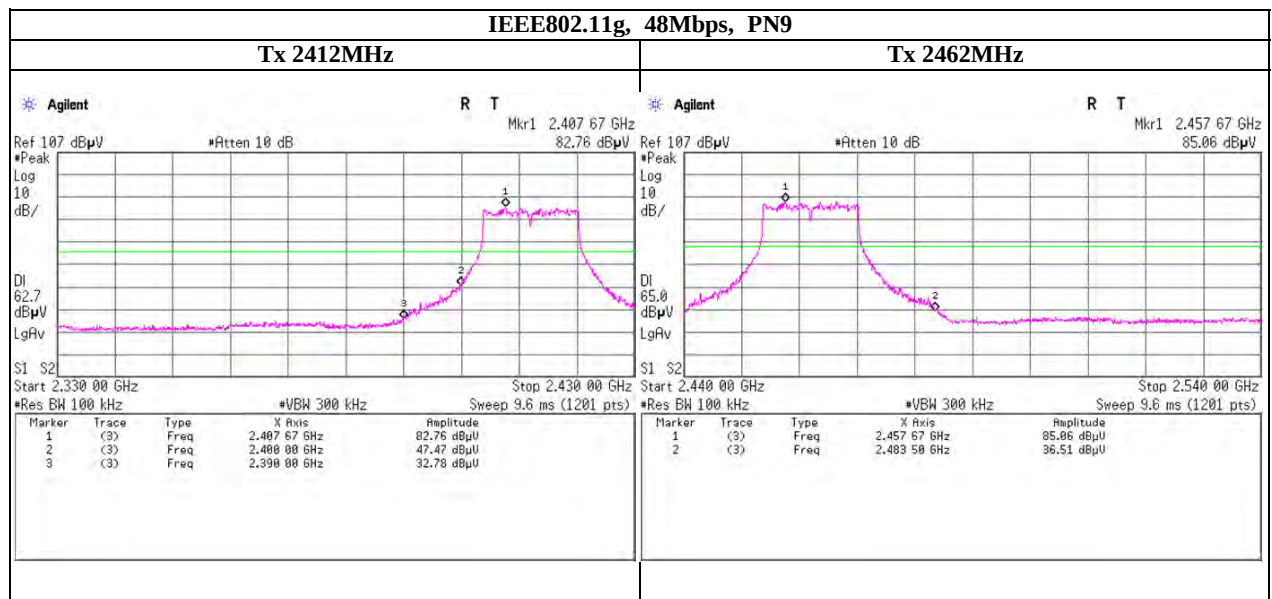
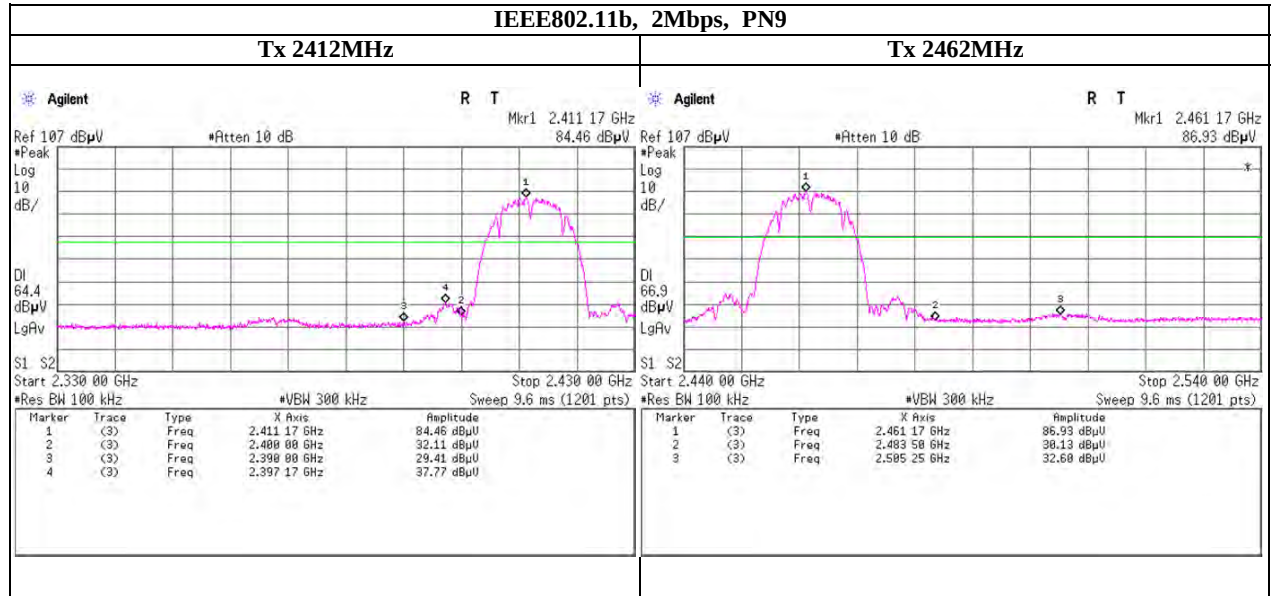
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Spurious emission (Conducted)

Band Edge compliance



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Power Density

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date 2011/1/19
Temperature / Humidity 24deg.C. , 22%
Engineer Shinichi Takano
Mode Tx

[IEEE802.11b, 2Mbps, PN9]

Ch. Freq.	Freq.	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	2411.38	-16.53	2.08	9.57	-4.88	8.00	12.88
2437	2436.38	-14.83	2.08	9.57	-3.18	8.00	11.18
2462	2461.38	-14.33	2.08	9.57	-2.68	8.00	10.68

[IEEE802.11g, 48Mbps, PN9]

Ch. Freq.	Freq.	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	2418.90	-18.32	2.08	9.57	-6.67	8.00	14.67
2437	2431.67	-16.34	2.08	9.57	-4.69	8.00	12.69
2462	2456.67	-15.94	2.08	9.57	-4.29	8.00	12.29

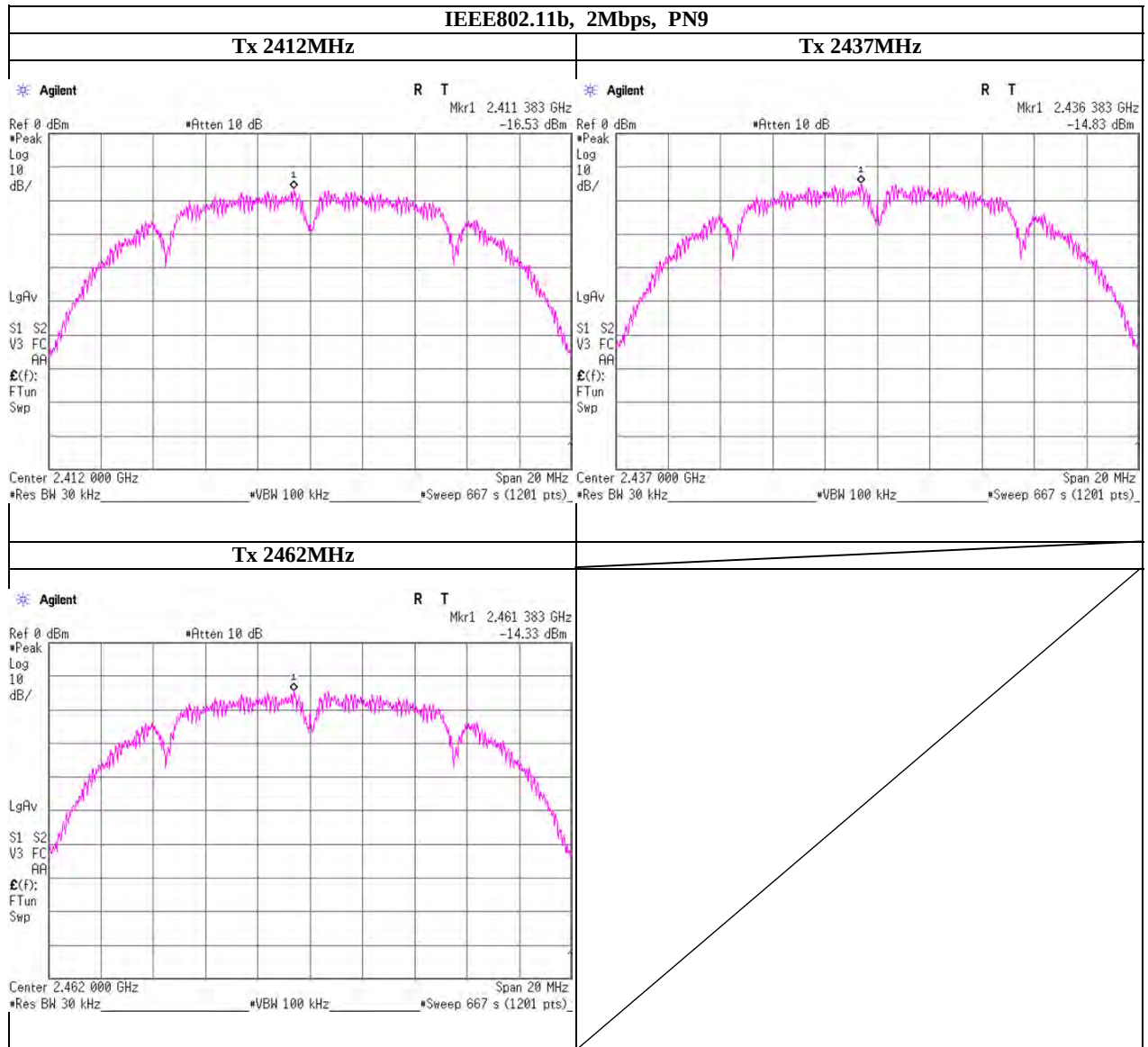
Sample Calculation:

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

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Power Density



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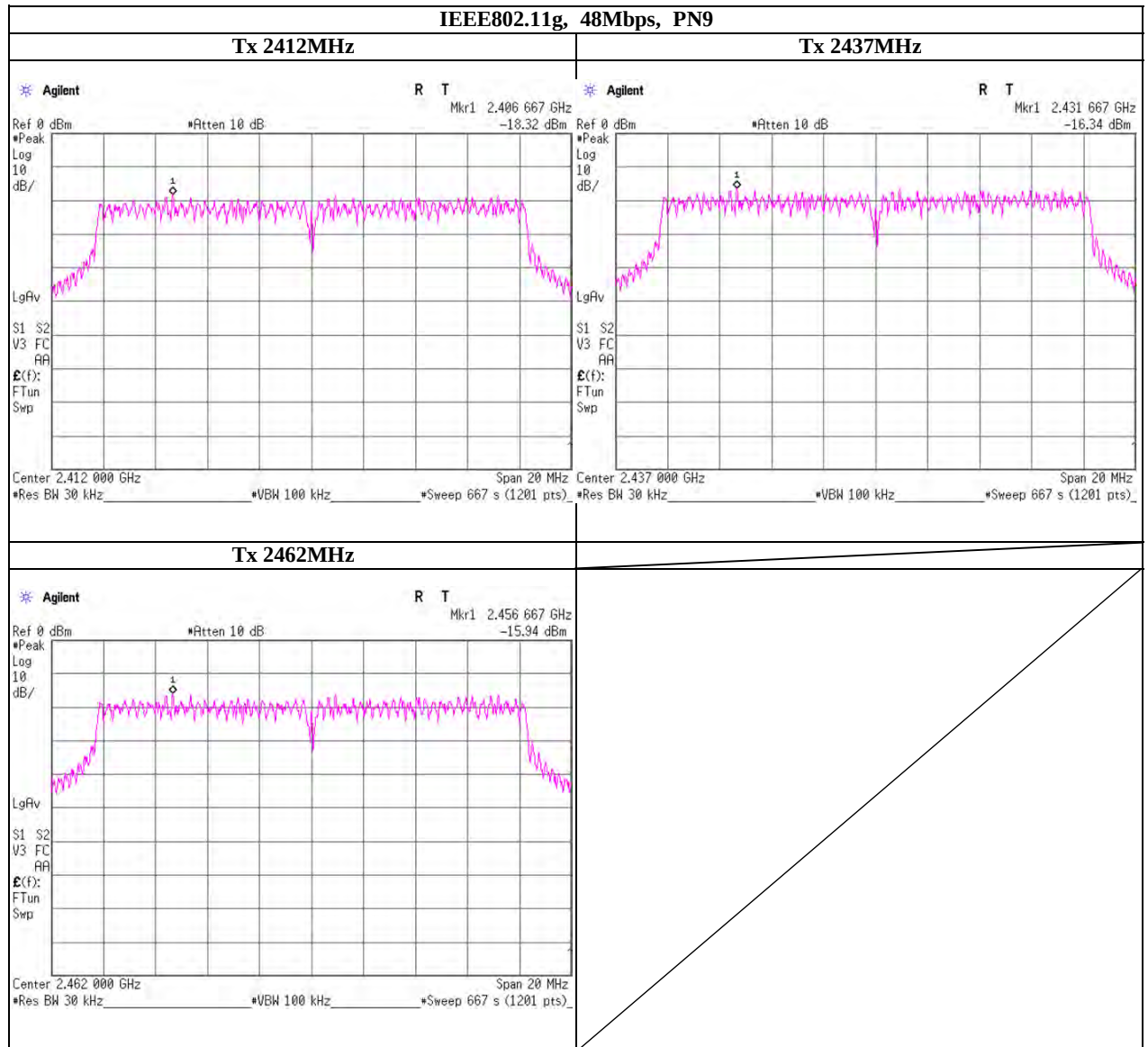
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99% Occupied Bandwidth



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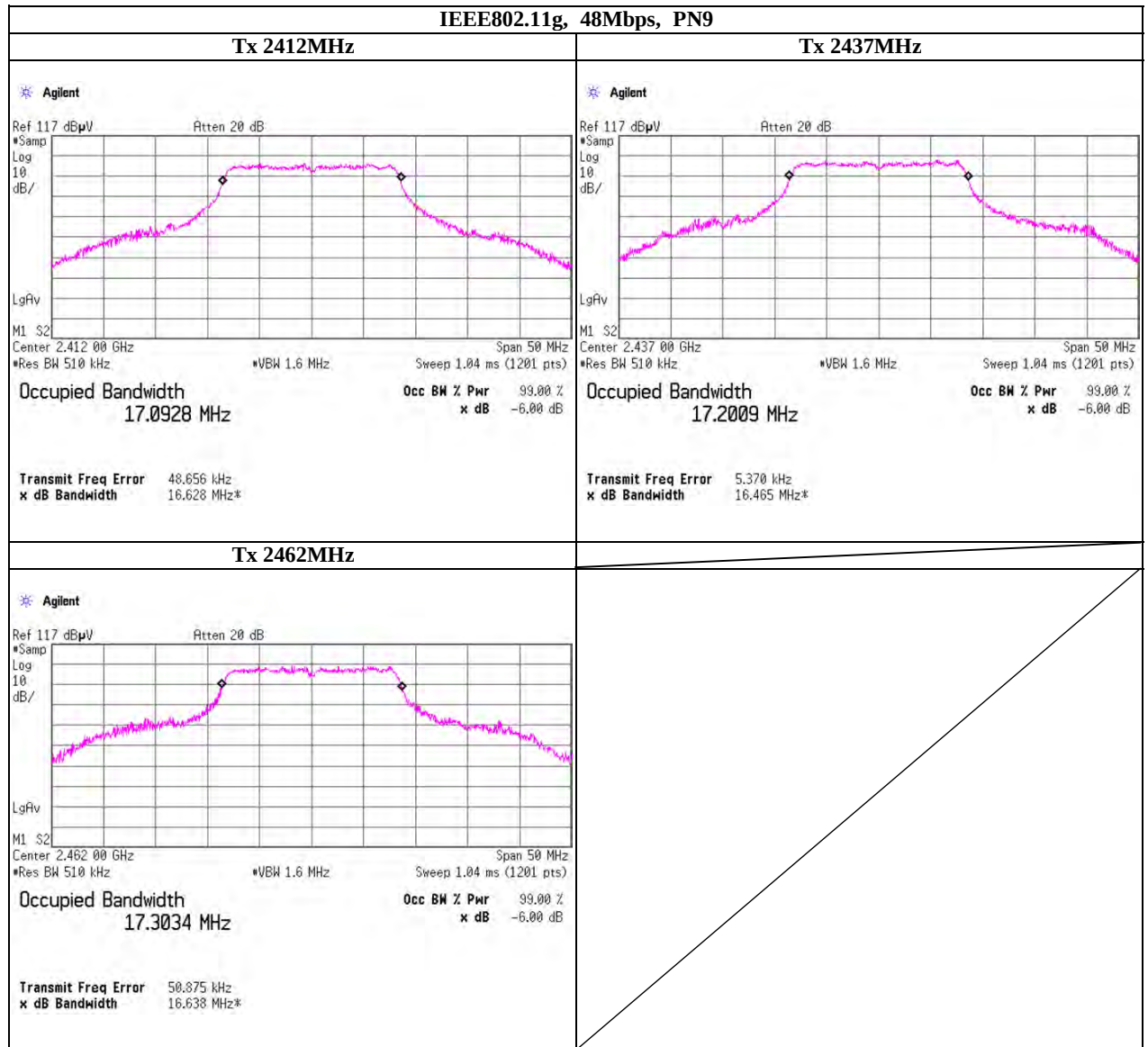
Shonan EMC Lab.

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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 *
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT,RE	2010/06/22 * 12
SPM-06	Power Meter	Anritsu	ML2495A	850009	AT	2010/04/01 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	917063	AT	2010/04/01 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2010/11/24 * 12
SAT20-05	Attenuator	Weinschel Corp.	54A-20	Y5649	AT	2010/11/24 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2010/03/09 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2010/03/09 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2010/02/17 * 12
SCC-C9/C10/SRSE-	Coaxial Cable&RF	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2010/04/02 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2010/02/19 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2010/02/06 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2010/02/17 * 12
STM-05	Terminator	TME	CT-01 BP	-	CE	2011/01/07 * 12
STR-03	Test Receiver	Rohde & Schwarz	ESI40	100054/040	CE	2010/07/21 * 12
SJM-10	Measure	PROMART	SEN1935	-	CE,RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV	-	CE,RE	-
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2010/03/09 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2010/04/16 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2010/05/27 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2010/08/17 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2010/02/09 * 12
SAT10-04	Attenuator(above1GHz)	Agilent	8493C-010	74863	RE	2010/12/15 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	51	RE	2010/12/15 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2010/03/09 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2010/04/16 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2010/05/25 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2010/08/08 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2010/02/09 * 12
SJM-07	Measure	PROMART	SEN1935	-	RE	-
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2010/02/06 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2010/02/06 * 12
SAT3-02	Attenuator	JFW	50HF-003N	-	RE	2010/02/06 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2010/10/11 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2010/04/02 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2010/04/02 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2010/10/11 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2010/02/09 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	RE	2010/08/18 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2010/09/04 * 12
SHA-04	Horn Antenna	ETS LINDGREN	460451	LM3640	RE	2010/03/29 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2010/03/02 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	19	RE	2010/03/02 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	RE	2010/04/05 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

CE: Conducted Emission

RE: Radiated Emission

AT: Antenna Terminal Conducted test

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