

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2010/12/06

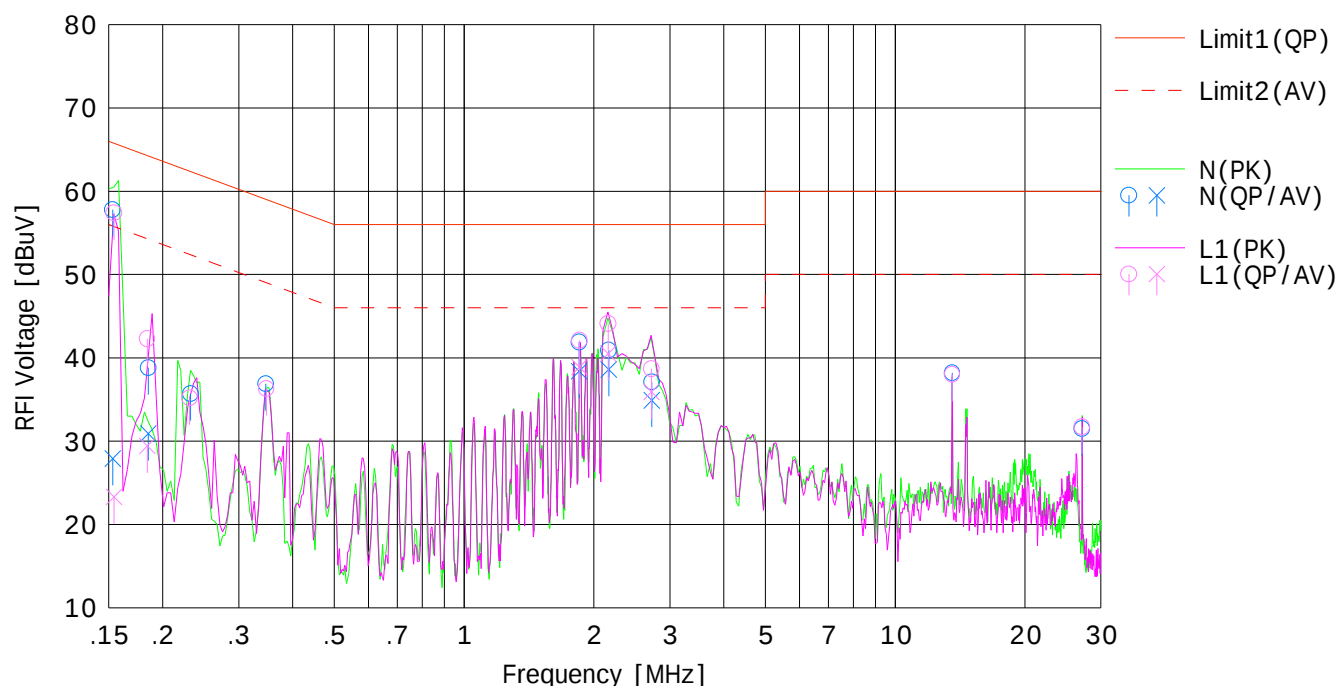
Company : RICOH COMPANY LTD.
Kind of E.U.T. : Color Laser Printer
Model No. : Aficio SP C431DN
Serial No. : S9491117019

Mode : Transmitting(DH-5_2441MHz)
Report No. : 31DE0105-SH
Power : AC120V/60Hz
Temp./Humi. : 26 / 37%

Remarks :

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

Engineer : Tatsuya Arai



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15300	43.9	14.0	13.9	57.8	27.9	65.8	55.8	8.0	27.9	N	
2	0.18500	25.6	17.7	13.2	38.8	30.9	64.2	54.2	25.4	23.3	N	
3	0.23200	22.9	---	12.8	35.7	---	62.3	52.3	26.6	---	N	
4	0.34680	24.1	---	12.8	36.9	---	59.0	49.0	22.1	---	N	
5	1.84900	29.2	25.7	12.7	41.9	38.4	56.0	46.0	14.1	7.6	N	
6	2.16500	28.2	25.9	12.7	40.9	38.6	56.0	46.0	15.1	7.4	N	
7	2.72300	24.3	22.1	12.8	37.1	34.9	56.0	46.0	18.9	11.1	N	
8	13.56000	24.9	---	13.3	38.2	---	60.0	50.0	21.8	---	N	
9	27.12000	17.4	---	14.1	31.5	---	60.0	50.0	28.5	---	N	
10	0.15409	43.5	9.4	13.9	57.4	23.3	65.7	55.7	8.3	32.4	L1	
11	0.18400	29.1	16.2	13.2	42.3	29.4	64.3	54.3	22.0	24.9	L1	
12	0.23070	22.4	---	12.8	35.2	---	62.4	52.4	27.2	---	L1	
13	0.34750	23.5	---	12.8	36.3	---	59.0	49.0	22.7	---	L1	
14	1.85100	29.4	26.2	12.7	42.1	38.9	56.0	46.0	13.9	7.1	L1	
15	2.15900	31.4	27.8	12.7	44.1	40.5	56.0	46.0	11.9	5.5	L1	
16	2.72100	25.9	23.1	12.8	38.7	35.9	56.0	46.0	17.3	10.1	L1	
17	13.56000	24.7	---	13.3	38.0	---	60.0	50.0	22.0	---	L1	
18	27.12000	17.6	---	14.1	31.7	---	60.0	50.0	28.3	---	L1	

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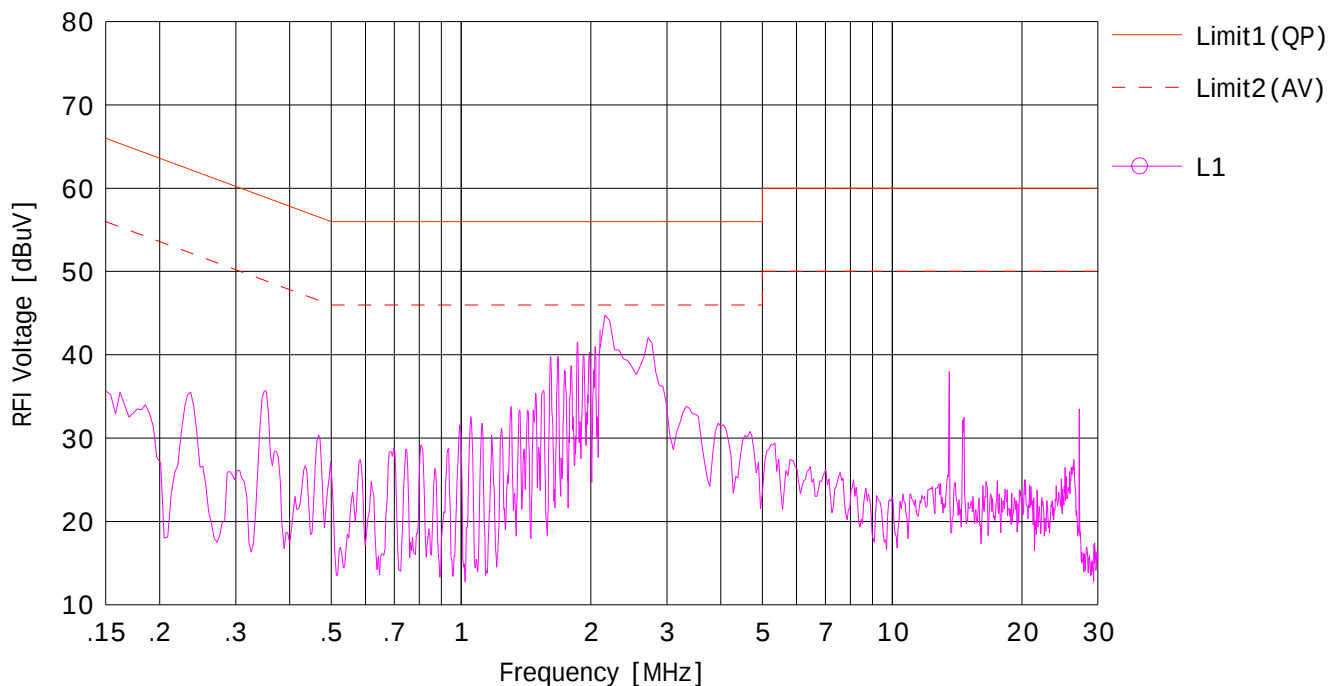
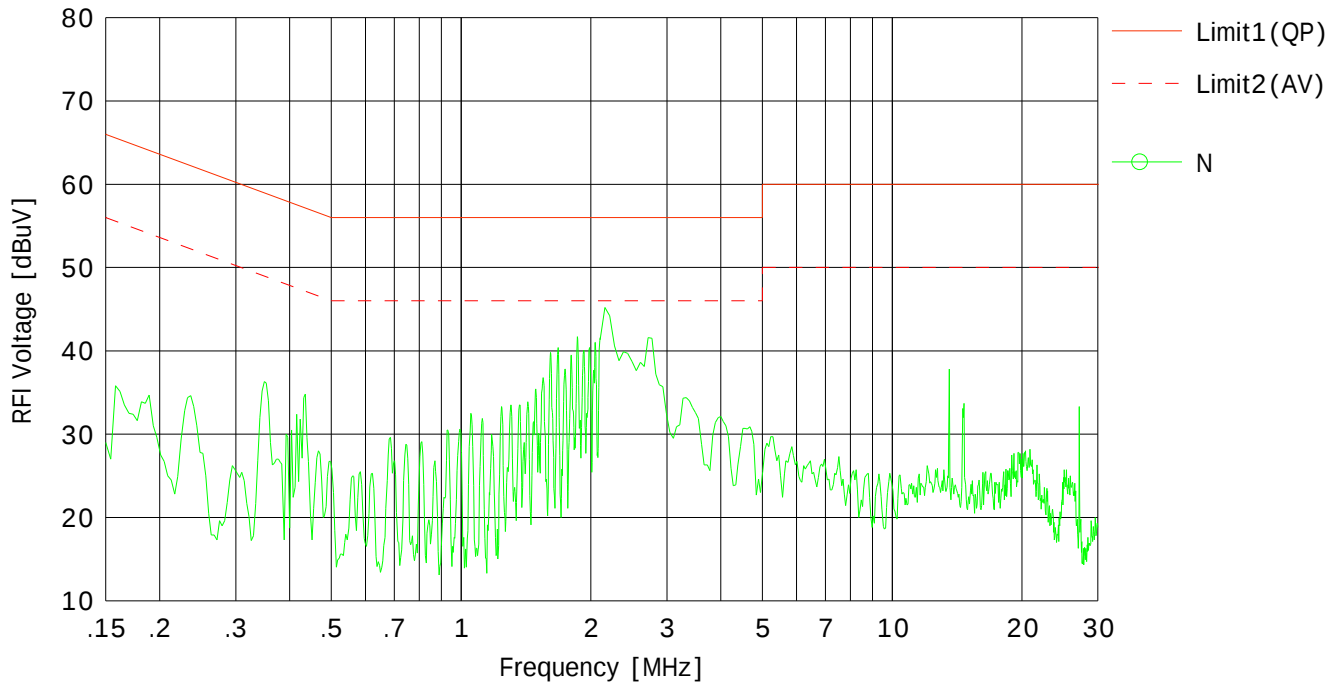
Company : RICOH COMPANY LTD.
Kind of E.U.T. : Color Laser Printer
Model No. : Aficio SP C431DN
Serial No. : S9491117019

Mode : Transmitting(DH-5_2402MHz)
Report No. : 31DE0105-SH
Power : AC120V/60Hz
Temp./Humi. : 26 / 37%

Remarks :

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

Engineer : Tatsuya Arai



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

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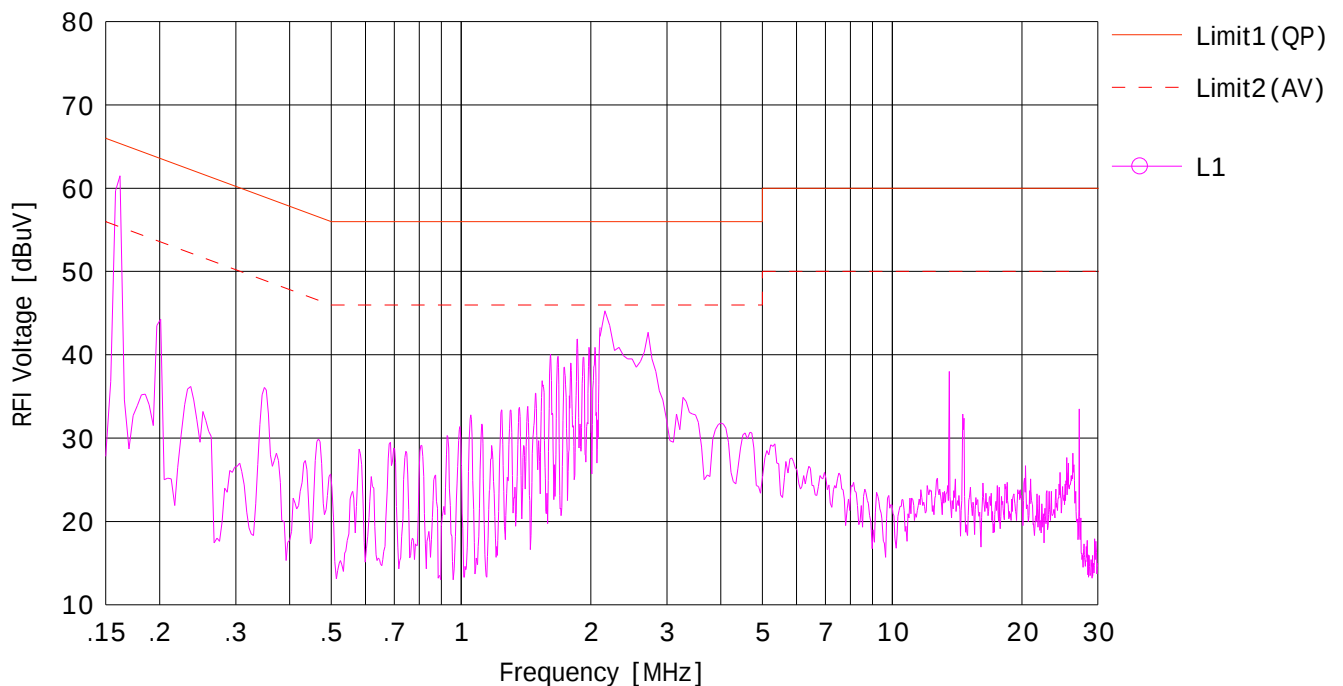
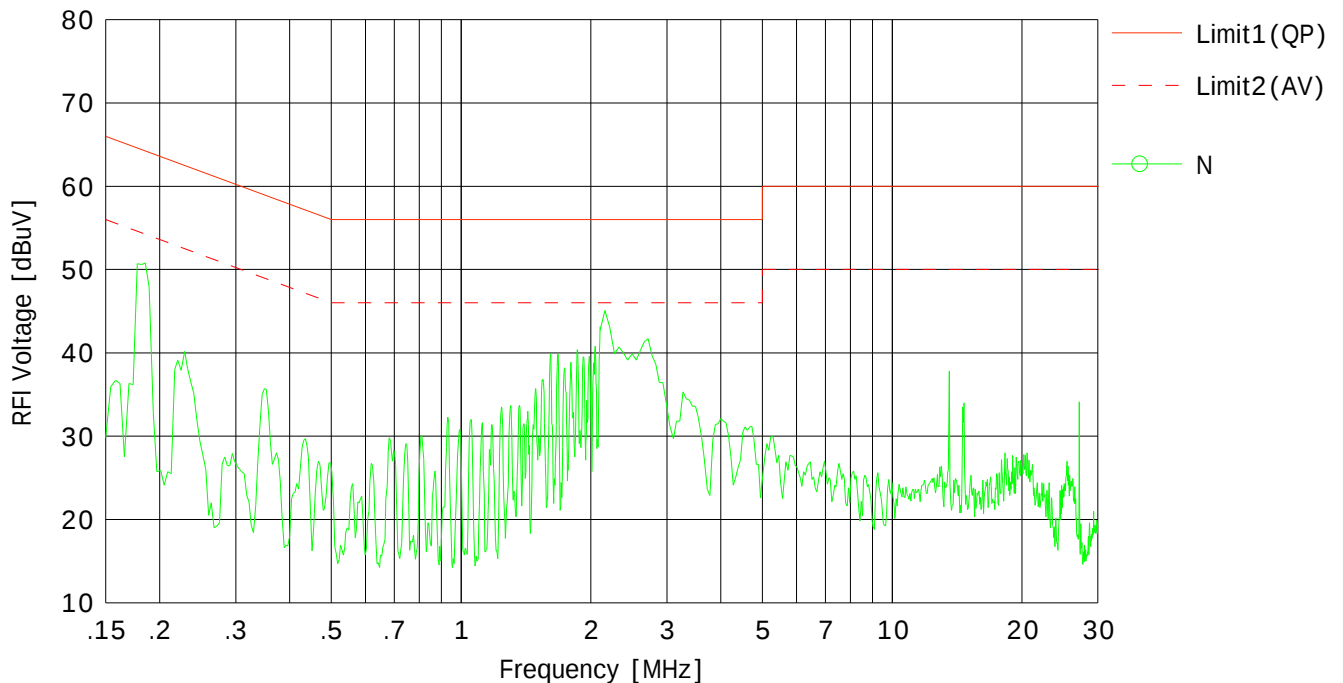
Company : RICOH COMPANY LTD.
Kind of E.U.T. : Color Laser Printer
Model No. : Aficio SP C431DN
Serial No. : S9491117019

Mode : Transmitting(DH-5_2480MHz)
Report No. : 31DE0105-SH
Power : AC120V/60Hz
Temp./Humi. : 26 / 37%

Remarks :

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

Engineer : Tatsuya Arai



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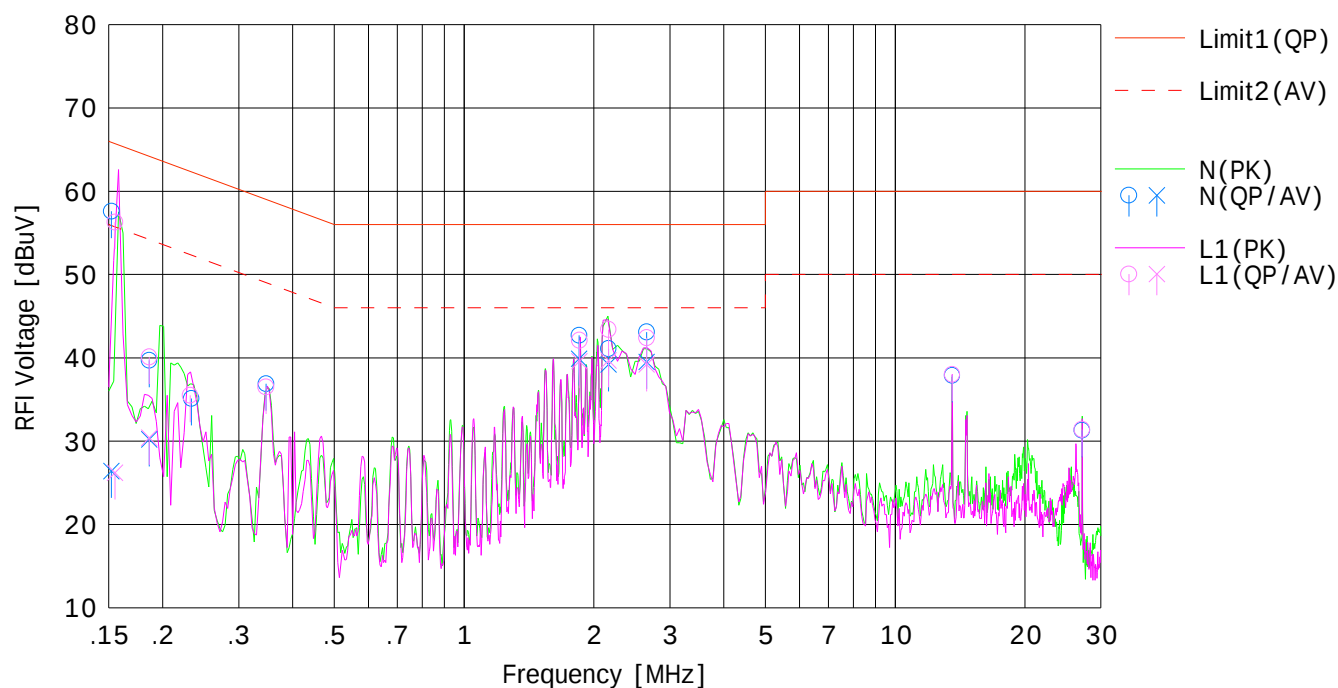
Company : RICOH COMPANY LTD.
Kind of E.U.T. : Color Laser Printer
Model No. : Aficio SP C431DN
Serial No. : S9491117019

Mode : Transmitting(3DH-5_2441MHz)
Report No. : 31DE0105-SH
Power : AC120V/60Hz
Temp./Humi. : 26 / 37%

Remarks :

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

Engineer : Tatsuya Arai



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15200	43.7	12.5	13.9	57.6	26.4	65.8	55.8	8.2	29.4	N	
2	0.18600	26.5	17.0	13.2	39.7	30.2	64.2	54.2	24.5	24.0	N	
3	0.23300	22.3	---	12.8	35.1	---	62.3	52.3	27.2	---	N	
4	0.34730	24.1	---	12.8	36.9	---	59.0	49.0	22.1	---	N	
5	1.84900	30.0	27.2	12.7	42.7	39.9	56.0	46.0	13.3	6.1	N	
6	2.16200	28.4	26.5	12.7	41.1	39.2	56.0	46.0	14.9	6.8	N	
7	2.65000	30.3	26.7	12.8	43.1	39.5	56.0	46.0	12.9	6.5	N	
8	13.56000	24.6	---	13.3	37.9	---	60.0	50.0	22.1	---	N	
9	27.12000	17.2	---	14.1	31.3	---	60.0	50.0	28.7	---	N	
10	0.15500	42.5	12.4	13.8	56.3	26.2	65.7	55.7	9.4	29.5	L1	
11	0.18600	26.9	17.2	13.2	40.1	30.4	64.2	54.2	24.1	23.8	L1	
12	0.23130	22.7	---	12.8	35.5	---	62.4	52.4	26.9	---	L1	
13	0.34710	23.7	---	12.8	36.5	---	59.0	49.0	22.5	---	L1	
14	1.85000	29.4	26.9	12.7	42.1	39.6	56.0	46.0	13.9	6.4	L1	
15	2.16200	30.7	27.0	12.7	43.4	39.7	56.0	46.0	12.6	6.3	L1	
16	2.65000	29.6	26.4	12.8	42.4	39.2	56.0	46.0	13.6	6.8	L1	
17	13.56000	24.7	---	13.3	38.0	---	60.0	50.0	22.0	---	L1	
18	27.12000	17.3	---	14.1	31.4	---	60.0	50.0	28.6	---	L1	

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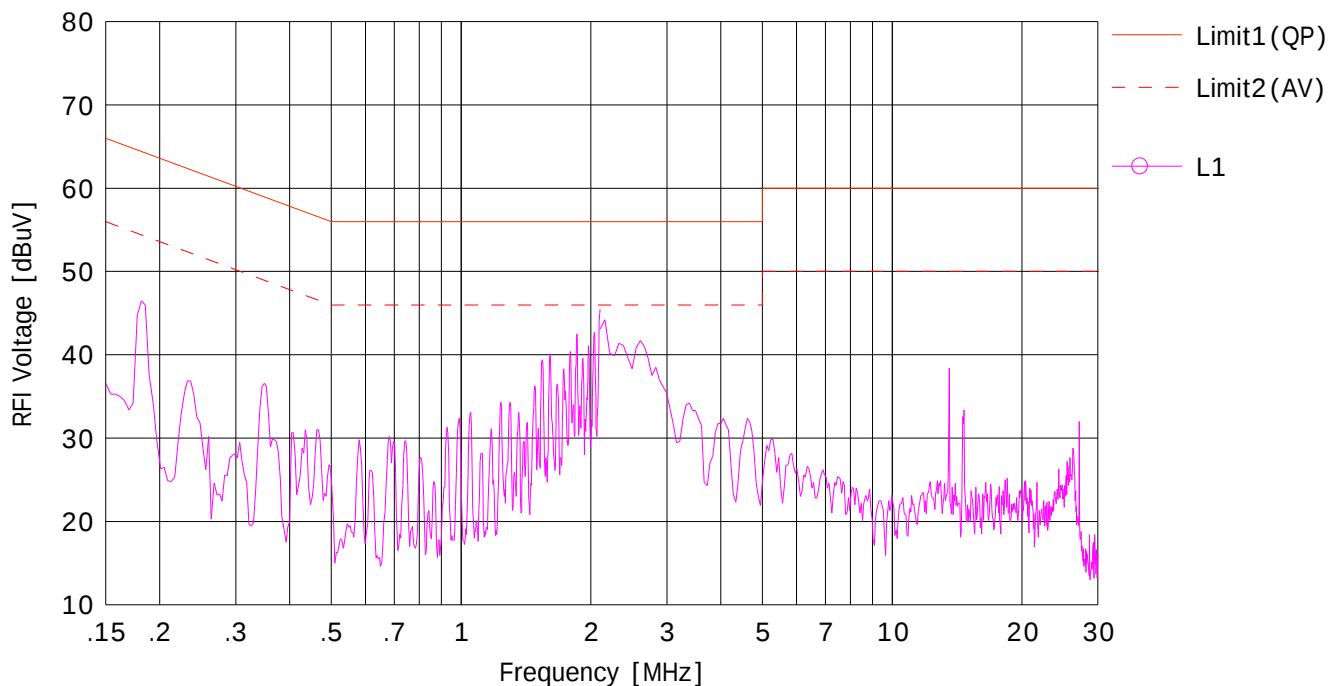
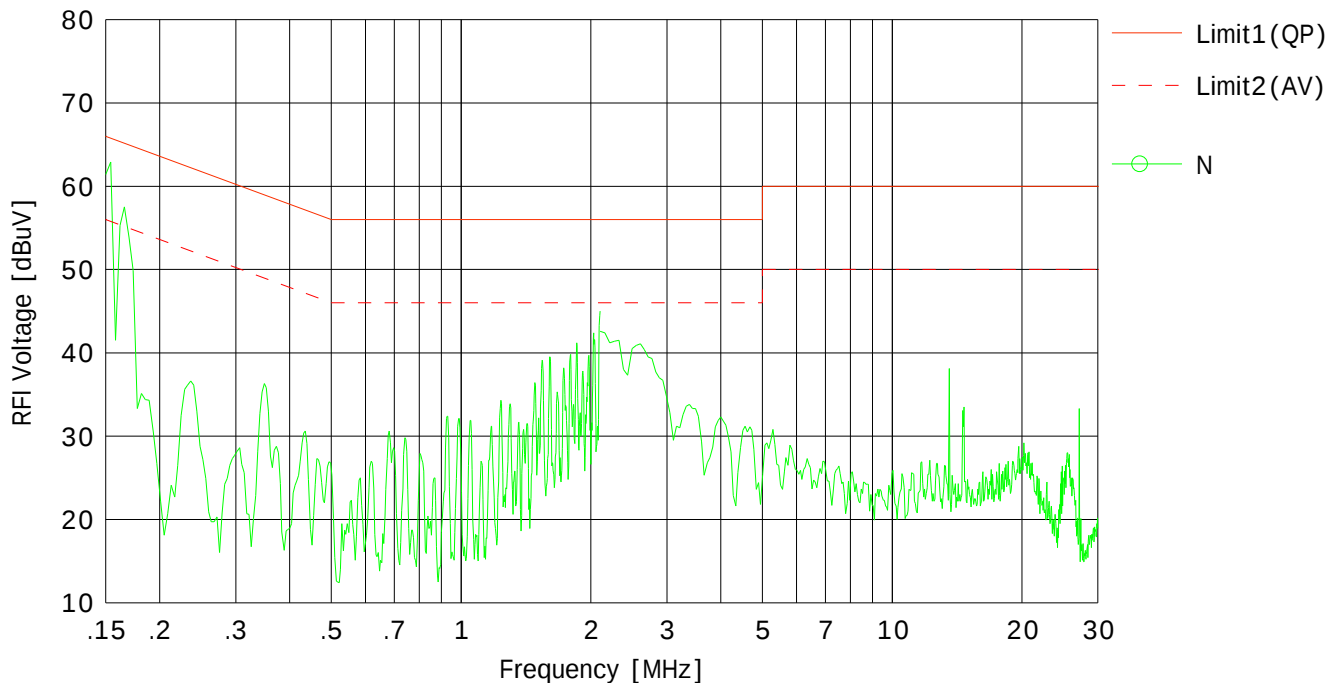
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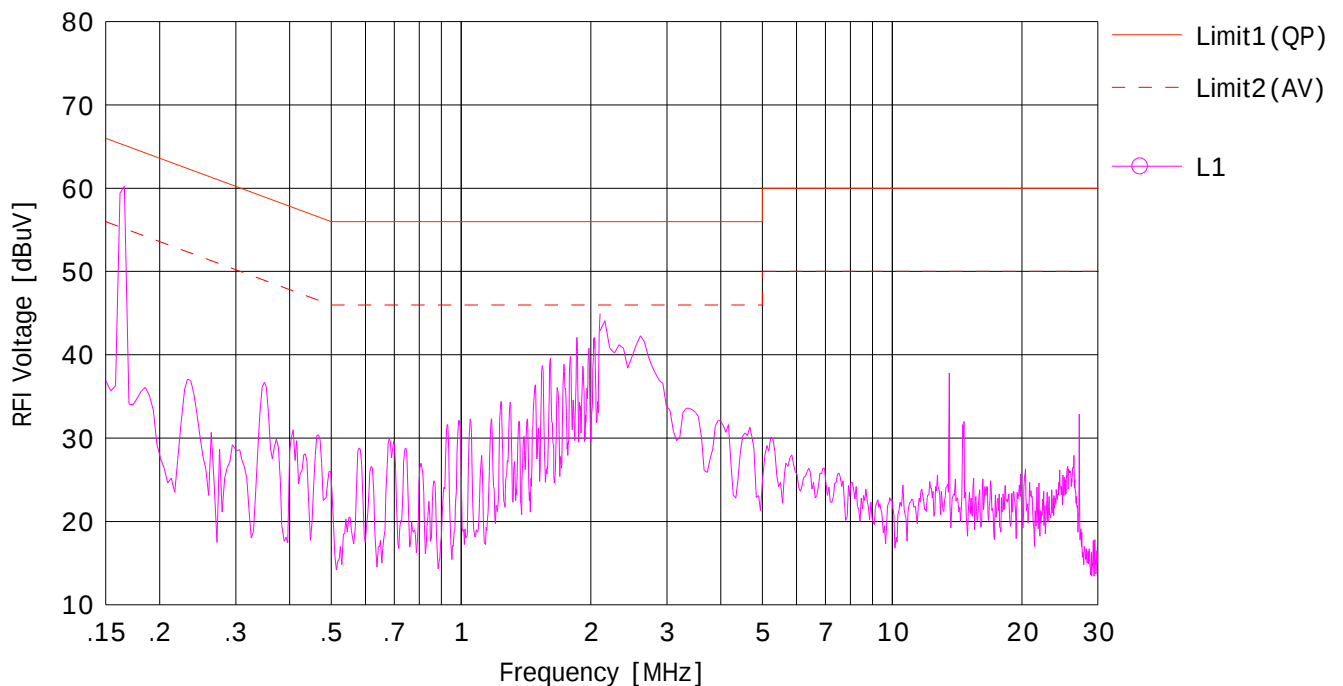
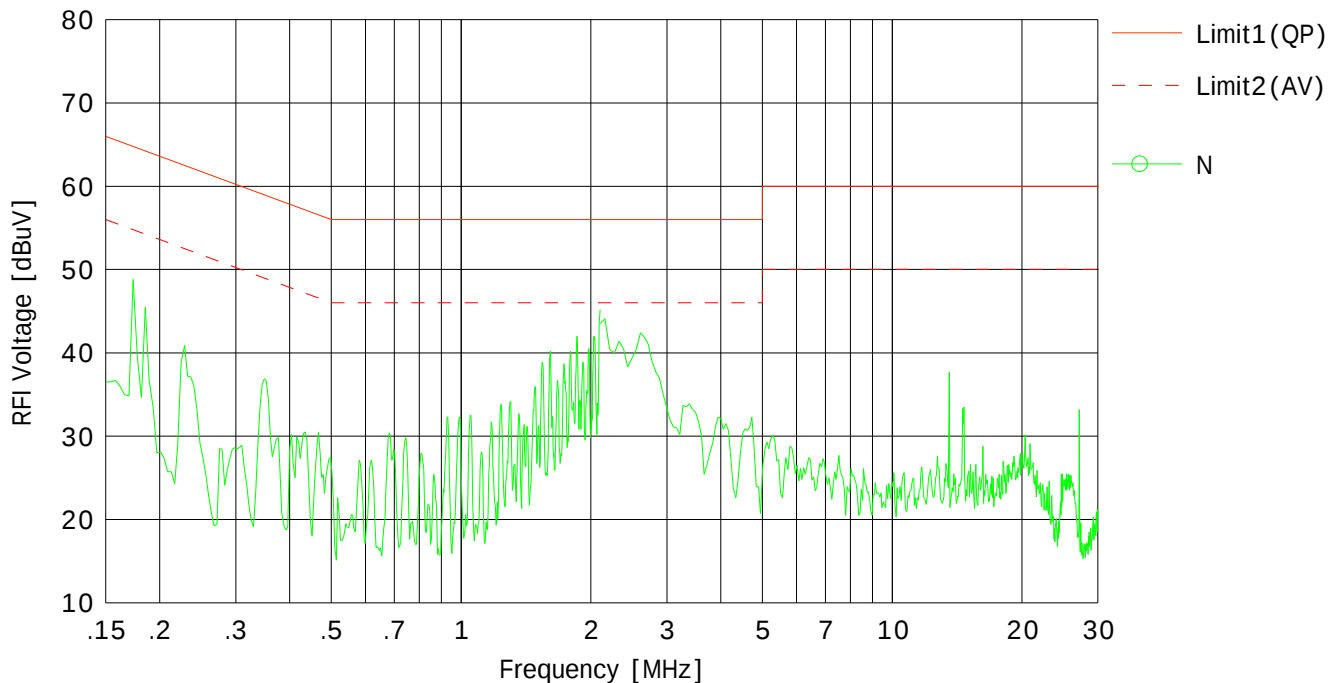
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Engineer : Tatsuya Arai



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

Radiated Emission

Test place: UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date: 2010/12/3 2010/12/4
Temperature / Humidity: 24deg.C, 49% 24deg.C, 29%
Engineer: Makoto Hosaka Yasumasa Owaki
Mode: Tx, 2402 MHz
Bluetooth, DH5

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.	189.842	QP	42.7	16.0	7.8	32.0	34.5	43.5	9.0	172	268	
Hori.	233.011	QP	41.3	16.8	8.1	32.0	34.2	46.0	11.8	152	159	
Hori.	624.999	QP	39.4	18.6	9.7	31.9	35.8	46.0	10.2	136	324	
Hori.	660.048	QP	38.0	19.2	9.9	31.9	35.2	46.0	10.8	114	271	
Hori.	932.354	QP	32.1	21.0	10.8	30.7	33.2	46.0	12.8	100	331	
Hori.	2390.000	PK	47.0	27.5	13.3	40.2	47.6	73.9	26.3	100	174	
Hori.	4804.000	PK	52.2	31.5	5.5	40.1	49.1	73.9	24.8	102	286	
Hori.	7206.000	PK	49.8	36.4	6.7	38.3	54.6	73.9	19.3	102	226	
Hori.	9608.000	PK	46.1	37.9	7.8	37.3	54.5	73.9	19.4	100	216	
Hori.	12010.000	PK	46.0	39.4	9.0	38.4	56.0	73.9	17.9	100	183	
Hori.	14412.000	PK	49.9	41.2	0.5	38.3	53.3	73.9	20.6	100	232	
Hori.	19216.000	PK	53.0	40.0	-3.0	47.6	42.4	73.9	31.5	102	219	
Vert.	38.951	QP	38.9	15.0	6.6	32.1	28.4	40.0	11.6	100	90	
Vert.	41.602	QP	40.6	14.2	6.7	32.1	29.4	40.0	10.6	100	80	
Vert.	166.419	QP	42.0	15.4	7.7	32.0	33.1	43.5	10.4	100	356	
Vert.	2390.000	PK	49.6	27.5	13.3	40.2	50.2	73.9	23.7	100	225	
Vert.	4804.000	PK	54.7	31.5	5.5	40.1	51.6	73.9	22.3	100	199	
Vert.	7206.000	PK	47.8	36.4	6.7	38.3	52.6	73.9	21.3	100	358	
Vert.	9608.000	PK	45.6	37.9	7.8	37.3	54.0	73.9	19.9	100	227	
Vert.	12010.000	PK	46.3	39.4	9.0	38.4	56.3	73.9	17.6	100	303	
Vert.	14412.000	PK	50.2	41.2	0.5	38.3	53.6	73.9	20.3	116	229	
Vert.	19216.000	PK	56.7	40.0	-3.0	47.6	46.1	73.9	27.8	113	225	

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 8th harmonic was not seen so the result was its base noise level.

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.	2402.000	PK	99.4	27.5	13.3	40.2	100.0	-	-	-
Hori.	2400.000	PK	56.4	27.5	13.3	40.2	57.0	80.0	23.0	
Vert.	2402.000	PK	100.9	27.5	13.3	40.2	101.5	-	-	-
Vert.	2400.000	PK	51.7	27.5	13.3	40.2	52.3	81.5	29.2	

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	36.5	27.5	13.3	40.2	-24.7	12.4	54.0	41.6	VBW = 300Hz
Hori.	4804.000	AV	46.2	31.5	5.5	40.1	-24.7	18.4	54.0	35.6	VBW = 300Hz
Hori.	7206.000	AV	38.2	36.4	6.7	38.3	-24.7	18.3	54.0	35.7	VBW = 300Hz
Hori.	9608.000	AV	34.5	37.9	7.8	37.3	-24.7	18.2	54.0	35.8	VBW = 300Hz
Hori.	12010.000	AV	34.4	39.4	9.0	38.4	-24.7	19.7	54.0	34.3	VBW = 300Hz
Hori.	14412.000	AV	39.4	41.2	0.5	38.3	-24.7	18.1	54.0	35.9	VBW = 300Hz
Hori.	19216.000	AV	45.8	40.0	-3.0	47.6	-24.7	10.5	54.0	43.5	VBW = 300Hz
Vert.	2390.000	AV	36.0	27.5	13.3	40.2	-24.7	11.9	54.0	42.1	VBW = 300Hz
Vert.	4804.000	AV	49.7	31.5	5.5	40.1	-24.7	21.9	54.0	32.1	VBW = 300Hz
Vert.	7206.000	AV	36.0	36.4	6.7	38.3	-24.7	16.1	54.0	37.9	VBW = 300Hz
Vert.	9608.000	AV	34.3	37.9	7.8	37.3	-24.7	18.0	54.0	36.0	VBW = 300Hz
Vert.	12010.000	AV	34.5	39.4	9.0	38.4	-24.7	19.8	54.0	34.2	VBW = 300Hz
Vert.	14412.000	AV	40.2	41.2	0.5	38.3	-24.7	18.9	54.0	35.1	VBW = 300Hz
Vert.	19216.000	AV	48.5	40.0	-3.0	47.6	-24.7	13.2	54.0	40.8	VBW = 300Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

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

*No noise was detected above the 5th order harmonics.

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 2010/12/3 2010/12/4
Temperature / Humidity 24deg.C. , 49% 24deg.C. , 29%
Engineer Makoto Hosaka Yasumasa Owaki
Mode Tx, 2441 MHz
 Bluetooth, DH5

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.	189.836	QP	42.8	16.0	7.8	32.0	34.6	43.5	8.9	171	263	
Hori.	625.003	QP	39.5	18.6	9.8	31.9	36.0	46.0	10.0	138	327	
Hori.	665.894	QP	38.6	19.3	9.9	31.9	35.9	46.0	10.1	118	268	
Hori.	799.153	QP	34.5	20.2	10.4	31.6	33.5	46.0	12.5	109	324	
Hori.	932.347	QP	32.4	21.0	10.8	30.7	33.5	46.0	12.5	100	336	
Hori.	4882.000	PK	52.7	31.7	5.6	40.0	50.0	73.9	23.9	102	288	
Hori.	7323.000	PK	47.8	36.7	6.9	38.5	52.9	73.9	21.0	100	232	
Hori.	9764.000	PK	46.7	38.2	7.8	37.4	55.3	73.9	18.6	100	220	
Hori.	12205.000	PK	46.7	39.2	9.1	38.1	56.9	73.9	17.0	106	150	
Hori.	14646.000	PK	46.4	41.6	0.5	38.3	50.2	73.9	23.7	100	0	
Hori.	19528.000	PK	49.3	40.1	-2.9	47.4	39.1	73.9	34.8	100	219	
Vert.	41.614	QP	40.5	14.2	6.7	32.1	29.3	40.0	10.7	100	82	
Vert.	166.423	QP	41.5	15.4	7.7	32.0	32.6	43.5	10.9	100	359	
Vert.	4882.000	PK	53.5	31.7	5.6	40.0	50.8	73.9	23.1	102	183	
Vert.	7323.000	PK	47.5	36.7	6.9	38.5	52.6	73.9	21.3	118	185	
Vert.	9608.000	PK	45.7	37.9	7.8	37.3	54.1	73.9	19.8	100	218	
Vert.	12205.000	PK	46.4	39.2	9.1	38.1	56.6	73.9	17.3	100	211	
Vert.	14646.000	PK	45.8	41.6	0.5	38.3	49.6	73.9	24.3	100	218	
Vert.	19528.000	PK	53.3	40.1	-2.9	47.4	43.1	73.9	30.8	141	224	

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 8th harmonic was not seen so the result was its base noise level.

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4882.000	AV	46.0	31.7	5.6	40.0	-24.7	18.6	54.0	35.4	VBW = 300Hz
Hori.	7323.000	AV	36.1	36.7	6.9	38.5	-24.7	16.5	54.0	37.5	VBW = 300Hz
Hori.	9764.000	AV	35.0	38.2	7.8	37.4	-24.7	18.9	54.0	35.1	VBW = 300Hz
Hori.	12205.000	AV	34.4	39.2	9.1	38.1	-24.7	19.9	54.0	34.1	VBW = 300Hz
Hori.	14646.000	AV	34.1	41.6	0.5	38.3	-24.7	13.2	54.0	40.8	VBW = 300Hz
Hori.	19528.000	AV	39.5	40.1	-2.9	47.4	-24.7	4.6	54.0	49.4	VBW = 300Hz
Vert.	4882.000	AV	48.3	31.7	5.6	40.0	-24.7	20.9	54.0	33.1	VBW = 300Hz
Vert.	7323.000	AV	35.4	36.7	6.9	38.5	-24.7	15.8	54.0	38.2	VBW = 300Hz
Vert.	9608.000	AV	33.7	37.9	7.8	37.3	-24.7	17.4	54.0	36.6	VBW = 300Hz
Vert.	12205.000	AV	34.4	39.2	9.1	38.1	-24.7	19.9	54.0	34.1	VBW = 300Hz
Vert.	14646.000	AV	33.9	41.6	0.5	38.3	-24.7	13.0	54.0	41.0	VBW = 300Hz
Vert.	19528.000	AV	43.0	40.1	-2.9	47.4	-24.7	8.1	54.0	45.9	VBW = 300Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

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

*No noise was detected above the 5th order harmonics.

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date 2010/12/3 2010/12/4
Temperature / Humidity 24deg.C. , 49% 24deg.C. , 29%
Engineer Makoto Hosaka Yasumasa Owaki
Mode Tx, 2480 MHz
 Bluetooth, DH5

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.	189.841	QP	43.2	16.0	7.8	32.0	35.0	43.5	8.5	168	261	
Hori.	232.906	QP	38.6	16.8	8.1	32.0	31.5	46.0	14.5	150	145	
Hori.	625.012	QP	39.3	18.6	9.8	31.9	35.8	46.0	10.2	144	322	
Hori.	665.918	QP	37.5	19.3	9.9	31.9	34.8	46.0	11.2	114	268	
Hori.	932.356	QP	32.0	21.0	10.8	30.7	33.1	46.0	12.9	100	341	
Hori.	2483.500	PK	63.8	27.6	13.4	40.1	64.7	73.9	9.2	151	185	
Hori.	4960.000	PK	51.7	31.9	5.6	40.0	49.2	73.9	24.7	100	294	
Hori.	7440.000	PK	49.7	36.9	7.1	38.7	55.0	73.9	18.9	100	229	
Hori.	9920.000	PK	46.8	38.4	8.0	37.5	55.7	73.9	18.2	100	322	
Hori.	12400.000	PK	46.7	39.1	9.4	37.9	57.3	73.9	16.6	100	0	
Hori.	14880.000	PK	45.9	41.9	0.3	37.9	50.2	73.9	23.7	100	227	
Hori.	19840.000	PK	46.8	40.2	-2.9	47.4	36.7	73.9	37.2	100	263	
Vert.	41.621	QP	40.6	14.2	6.7	32.1	29.4	40.0	10.6	100	94	
Vert.	166.416	QP	41.5	15.4	7.7	32.0	32.6	43.5	10.9	100	358	
Vert.	2483.500	PK	63.4	27.6	13.4	40.1	64.3	73.9	9.6	167	221	
Vert.	4960.000	PK	54.5	31.9	5.6	40.0	52.0	73.9	21.9	100	314	
Vert.	7440.000	PK	48.3	36.9	7.1	38.7	53.6	73.9	20.3	100	0	
Vert.	9920.000	PK	48.5	38.4	8.0	37.5	57.4	73.9	16.5	100	220	
Vert.	12400.000	PK	47.6	39.1	9.4	37.9	58.1	73.9	15.8	100	0	
Vert.	14880.000	PK	46.9	41.9	0.3	37.9	51.2	73.9	22.7	100	206	
Vert.	19840.000	PK	47.3	40.2	-2.9	47.4	37.2	73.9	36.7	131	236	

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 8th harmonic was not seen so the result was its base noise level.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	34.8	27.6	13.4	40.1	-24.7	11.0	54.0	43.0	VBW = 300Hz
Hori.	4960.000	AV	44.5	31.9	5.6	40.0	-24.7	17.3	54.0	36.7	VBW = 300Hz
Hori.	7440.000	AV	38.7	36.9	7.1	38.7	-24.7	19.3	54.0	34.7	VBW = 300Hz
Hori.	9920.000	AV	34.3	38.4	8.0	37.5	-24.7	18.5	54.0	35.5	VBW = 300Hz
Hori.	12400.000	AV	34.5	39.1	9.4	37.9	-24.7	20.4	54.0	33.6	VBW = 300Hz
Hori.	14880.000	AV	34.7	41.9	9.8	37.9	-24.7	23.8	54.0	30.2	VBW = 300Hz
Hori.	19840.000	AV	35.1	40.2	6.6	47.4	-24.7	9.8	54.0	44.2	VBW = 300Hz
Vert.	2483.500	AV	34.8	27.6	13.4	40.1	-24.7	11.0	54.0	43.0	VBW = 300Hz
Vert.	4960.000	AV	49.0	31.9	5.6	40.0	-24.7	21.8	54.0	32.2	VBW = 300Hz
Vert.	7440.000	AV	36.7	36.9	7.1	38.7	-24.7	17.3	54.0	36.7	VBW = 300Hz
Vert.	9920.000	AV	36.3	38.4	8.0	37.5	-24.7	20.5	54.0	33.5	VBW = 300Hz
Vert.	12400.000	AV	34.5	39.1	9.4	37.9	-24.7	20.4	54.0	33.6	VBW = 300Hz
Vert.	14880.000	AV	34.6	41.9	9.8	37.9	-24.7	23.7	54.0	30.3	VBW = 300Hz
Vert.	19840.000	AV	37.0	40.2	6.6	47.4	-24.7	11.7	54.0	42.3	VBW = 300Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

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

*No noise was detected above the 5th order harmonics.

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date 2010/12/3 2010/12/4
Temperature / Humidity 24deg.C. , 49% 24deg.C. , 29%
Engineer Makoto Hosaka Yasumasa Owaki
Mode Tx, 2402 MHz
 Bluetooth, 3-DH5

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.	189.840	QP	42.9	16.0	7.8	32.0	34.7	43.5	8.8	173	261	
Hori.	233.006	QP	41.0	16.8	8.1	32.0	33.9	46.0	12.1	150	151	
Hori.	625.005	QP	39.5	18.6	9.8	31.9	36.0	46.0	10.0	139	324	
Hori.	660.062	QP	37.4	19.2	9.9	31.9	34.6	46.0	11.4	110	269	
Hori.	932.351	QP	32.0	21.0	10.8	30.7	33.1	46.0	12.9	100	339	
Hori.	2390.000	PK	47.8	27.5	13.3	40.2	48.4	73.9	25.5	160	174	
Hori.	4804.000	PK	50.1	31.5	5.5	40.1	47.0	73.9	26.9	104	286	
Hori.	7206.000	PK	48.6	36.4	6.7	38.3	53.4	73.9	20.5	100	199	
Hori.	9608.000	PK	45.8	37.9	7.8	37.3	54.2	73.9	19.7	100	196	
Hori.	12010.000	PK	47.1	39.4	9.0	38.4	57.1	73.9	16.8	100	212	
Hori.	14412.000	PK	46.1	41.2	0.5	38.3	49.5	73.9	24.4	100	241	
Hori.	19216.000	PK	47.8	40.0	-3.0	47.6	37.2	73.9	36.7	100	219	
Vert.	39.510	QP	39.7	14.8	6.6	32.1	29.0	40.0	11.0	100	67	
Vert.	166.422	QP	41.5	15.4	7.7	32.0	32.6	43.5	10.9	100	356	
Vert.	2390.000	PK	49.7	27.5	13.3	40.2	50.3	73.9	23.6	170	228	
Vert.	4804.000	PK	53.1	31.5	5.5	40.1	50.0	73.9	23.9	104	312	
Vert.	7206.000	PK	48.3	36.4	6.7	38.3	53.1	73.9	20.8	105	278	
Vert.	9608.000	PK	45.7	37.9	7.8	37.3	54.1	73.9	19.8	100	59	
Vert.	12010.000	PK	46.9	39.4	9.0	38.4	56.9	73.9	17.0	100	288	
Vert.	14412.000	PK	46.2	41.2	0.5	38.3	49.6	73.9	24.3	100	234	
Vert.	19216.000	PK	48.0	40.0	-3.0	47.6	37.4	73.9	36.5	113	225	

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 8th harmonic was not seen so the result was its base noise level.

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.	2402.000	PK	102.2	27.5	13.3	40.2	102.8	-	-	-
Hori.	2400.000	PK	55.4	27.5	13.3	40.2	56.0	82.8	26.8	
Vert.	2402.000	PK	99.8	27.5	13.3	40.2	100.4	-	-	-
Vert.	2400.000	PK	53.6	27.5	13.3	40.2	54.2	80.4	26.2	

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

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	35.8	27.5	13.3	40.2	-24.7	11.7	54.0	42.3	VBW = 300Hz
Hori.	4804.000	AV	40.6	31.5	5.5	40.1	-24.7	12.8	54.0	41.2	VBW = 300Hz
Hori.	7206.000	AV	36.6	36.4	6.7	38.3	-24.7	16.7	54.0	37.3	VBW = 300Hz
Hori.	9608.000	AV	33.7	37.9	7.8	37.3	-24.7	17.4	54.0	36.6	VBW = 300Hz
Hori.	12010.000	AV	34.6	39.4	9.0	38.4	-24.7	19.9	54.0	34.1	VBW = 300Hz
Hori.	14412.000	AV	34.6	41.2	0.5	38.3	-24.7	13.3	54.0	40.7	VBW = 300Hz
Hori.	19216.000	AV	35.4	40.0	-3.0	47.6	-24.7	0.1	54.0	53.9	VBW = 300Hz
Vert.	2390.000	AV	36.7	27.5	13.3	40.2	-24.7	12.6	54.0	41.4	VBW = 300Hz
Vert.	4804.000	AV	44.1	31.5	5.5	40.1	-24.7	16.3	54.0	37.7	VBW = 300Hz
Vert.	7206.000	AV	36.7	36.4	6.7	38.3	-24.7	16.8	54.0	37.2	VBW = 300Hz
Vert.	9608.000	AV	34.0	37.9	7.8	37.3	-24.7	17.7	54.0	36.3	VBW = 300Hz
Vert.	12010.000	AV	34.7	39.4	9.0	38.4	-24.7	20.0	54.0	34.0	VBW = 300Hz
Vert.	14412.000	AV	34.6	41.2	0.5	38.3	-24.7	13.3	54.0	40.7	VBW = 300Hz
Vert.	19216.000	AV	35.8	40.0	-3.0	47.6	-24.7	0.5	54.0	53.5	VBW = 300Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

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

*No noise was detected above the 5th order harmonics.

Radiated Emission

Test place: UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date: 2010/12/3
Temperature / Humidity: 24deg.C. , 49% 24deg.C. , 29%
Engineer: Makoto Hosaka Yasumasa Owaki
Mode: Tx, 2441 MHz
Bluetooth, 3-DH5

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.	189.840	QP	43.4	16.0	7.8	32.0	35.2	43.5	8.3	171	265	
Hori.	233.015	QP	41.2	16.8	8.1	32.0	34.1	46.0	11.9	150	151	
Hori.	625.008	QP	39.4	18.6	9.8	31.9	35.9	46.0	10.1	137	324	
Hori.	665.903	QP	37.5	19.3	9.9	31.9	34.8	46.0	11.2	115	270	
Hori.	932.373	QP	32.1	21.0	10.8	30.7	33.2	46.0	12.8	100	338	
Hori.	4882.000	PK	50.0	31.7	5.6	40.0	47.3	73.9	26.6	102	288	
Hori.	7323.000	PK	47.0	36.7	6.9	38.5	52.1	73.9	21.8	100	212	
Hori.	9764.000	PK	46.3	38.2	7.8	37.4	54.9	73.9	19.0	100	221	
Hori.	12205.000	PK	46.5	39.2	9.1	38.1	56.7	73.9	17.2	100	214	
Hori.	14646.000	PK	46.5	41.6	0.5	38.3	50.3	73.9	23.6	100	222	
Hori.	19528.000	PK	47.5	40.1	-2.9	47.4	37.3	73.9	36.6	100	243	
Vert.	41.617	QP	40.4	14.2	6.7	32.1	29.2	40.0	10.8	100	102	
Vert.	166.403	QP	41.8	15.4	7.7	32.0	32.9	43.5	10.6	100	344	
Vert.	4882.000	PK	52.7	31.7	5.6	40.0	50.0	73.9	23.9	102	183	
Vert.	7323.000	PK	47.1	36.7	6.9	38.5	52.2	73.9	21.7	100	227	
Vert.	9608.000	PK	45.5	37.9	7.8	37.3	53.9	73.9	20.0	100	297	
Vert.	12205.000	PK	46.7	39.2	9.1	38.1	56.9	73.9	17.0	100	285	
Vert.	14646.000	PK	45.3	41.6	0.5	38.3	49.1	73.9	24.8	100	207	
Vert.	19528.000	PK	46.7	40.1	-2.9	47.4	36.5	73.9	37.4	100	264	

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 8th harmonic was not seen so the result was its base noise level.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4882.000	AV	38.9	31.7	5.6	40.0	-24.7	11.5	54.0	42.5	VBW = 300Hz
Hori.	7323.000	AV	35.2	36.7	6.9	38.5	-24.7	15.6	54.0	38.4	VBW = 300Hz
Hori.	9764.000	AV	33.7	38.2	7.8	37.4	-24.7	17.6	54.0	36.4	VBW = 300Hz
Hori.	12205.000	AV	34.4	39.2	9.1	38.1	-24.7	19.9	54.0	34.1	VBW = 300Hz
Hori.	14646.000	AV	34.1	41.6	0.5	38.3	-24.7	13.2	54.0	40.8	VBW = 300Hz
Hori.	19528.000	AV	34.7	40.1	-2.9	47.4	-24.7	-0.2	54.0	54.2	VBW = 300Hz
Vert.	4882.000	AV	44.0	31.7	5.6	40.0	-24.7	16.6	54.0	37.4	VBW = 300Hz
Vert.	7323.000	AV	35.1	36.7	6.9	38.5	-24.7	15.5	54.0	38.5	VBW = 300Hz
Vert.	9608.000	AV	33.4	37.9	7.8	37.3	-24.7	17.1	54.0	36.9	VBW = 300Hz
Vert.	12205.000	AV	34.3	39.2	9.1	38.1	-24.7	19.8	54.0	34.2	VBW = 300Hz
Vert.	14646.000	AV	34.1	41.6	0.5	38.3	-24.7	13.2	54.0	40.8	VBW = 300Hz
Vert.	19528.000	AV	35.0	40.1	-2.9	47.4	-24.7	0.1	54.0	53.9	VBW = 300Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

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

*No noise was detected above the 5th order harmonics.

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date 2010/12/3 2010/12/4
Temperature / Humidity 24deg.C. , 49% 24deg.C. , 29%
Engineer Makoto Hosaka Yasumasa Owaki
Mode Tx, 2480 MHz
 Bluetooth, 3-DH5

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.	189.840	QP	43.1	16.0	7.8	32.0	34.9	43.5	8.6	167	263	
Hori.	233.024	QP	40.3	16.8	8.1	32.0	33.2	46.0	12.8	150	150	
Hori.	660.034	QP	37.1	19.2	9.9	31.9	34.3	46.0	11.7	118	268	
Hori.	792.017	QP	33.6	20.2	10.3	31.6	32.5	46.0	13.5	112	322	
Hori.	932.348	QP	32.1	21.0	10.8	30.7	33.2	46.0	12.8	100	340	
Hori.	2483.500	PK	60.6	27.6	13.4	40.1	61.5	73.9	12.4	152	33	
Hori.	4960.000	PK	49.9	31.9	5.6	40.0	47.4	73.9	26.5	100	294	
Hori.	7440.000	PK	48.2	36.9	7.1	38.7	53.5	73.9	20.4	100	0	
Hori.	9920.000	PK	45.7	38.4	8.0	37.5	54.6	73.9	19.3	100	0	
Hori.	12400.000	PK	46.0	39.1	9.4	37.9	56.6	73.9	17.3	100	0	
Hori.	14880.000	PK	46.3	41.9	0.3	37.9	50.6	73.9	23.3	100	216	
Hori.	19840.000	PK	46.0	40.2	-2.9	47.4	35.9	73.9	38.0	100	229	
Vert.	41.604	QP	40.3	14.2	6.7	32.1	29.1	40.0	10.9	100	85	
Vert.	166.418	QP	41.7	15.4	7.7	32.0	32.8	43.5	10.7	100	354	
Vert.	2483.500	PK	59.8	27.6	13.4	40.1	60.7	73.9	13.2	167	221	
Vert.	4960.000	PK	51.0	31.9	5.6	40.0	48.5	73.9	25.4	100	314	
Vert.	7440.000	PK	47.8	36.9	7.1	38.7	53.1	73.9	20.8	100	0	
Vert.	9920.000	PK	45.2	38.4	8.0	37.5	54.1	73.9	19.8	100	0	
Vert.	12400.000	PK	46.7	39.1	9.4	37.9	57.3	73.9	16.6	100	0	
Vert.	14880.000	PK	45.2	41.9	0.3	37.9	49.5	73.9	24.4	100	225	
Vert.	19840.000	PK	45.7	40.2	-2.9	47.4	35.6	73.9	38.3	100	276	

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 8th harmonic was not seen so the result was its base noise level.

Distance factor: 13GHz-40GHz 20log(3.0m/1.0m)= 9.5dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	39.4	27.6	13.4	40.1	-24.7	15.6	54.0	38.4	VBW = 300Hz
Hori.	4960.000	AV	42.1	31.9	5.6	40.0	-24.7	14.9	54.0	39.1	VBW = 300Hz
Hori.	7440.000	AV	35.8	36.9	7.1	38.7	-24.7	16.4	54.0	37.6	VBW = 300Hz
Hori.	9920.000	AV	33.5	38.4	8.0	37.5	-24.7	17.7	54.0	36.3	VBW = 300Hz
Hori.	12400.000	AV	34.5	39.1	9.4	37.9	-24.7	20.4	54.0	33.6	VBW = 300Hz
Hori.	14880.000	AV	33.6	41.9	0.3	37.9	-24.7	13.2	54.0	40.8	VBW = 300Hz
Hori.	19840.000	AV	34.6	40.2	-2.9	47.4	-24.7	-0.2	54.0	54.2	VBW = 300Hz
Vert.	2483.500	AV	39.4	27.6	13.4	40.1	-24.7	15.6	54.0	38.4	VBW = 300Hz
Vert.	4960.000	AV	42.1	31.9	5.6	40.0	-24.7	14.9	54.0	39.1	VBW = 300Hz
Vert.	7440.000	AV	35.8	36.9	7.1	38.7	-24.7	16.4	54.0	37.6	VBW = 300Hz
Vert.	9920.000	AV	33.5	38.4	8.0	37.5	-24.7	17.7	54.0	36.3	VBW = 300Hz
Vert.	12400.000	AV	34.5	39.1	9.4	37.9	-24.7	20.4	54.0	33.6	VBW = 300Hz
Vert.	14880.000	AV	33.6	41.9	0.3	37.9	-24.7	13.2	54.0	40.8	VBW = 300Hz
Vert.	19840.000	AV	34.5	40.2	-2.9	47.4	-24.7	-0.3	54.0	54.3	VBW = 300Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter)

- Gain(Amplifier) + Dwell time factor (Refer to Duty Fctor data)

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

*No noise was detected above the 5th order harmonics.

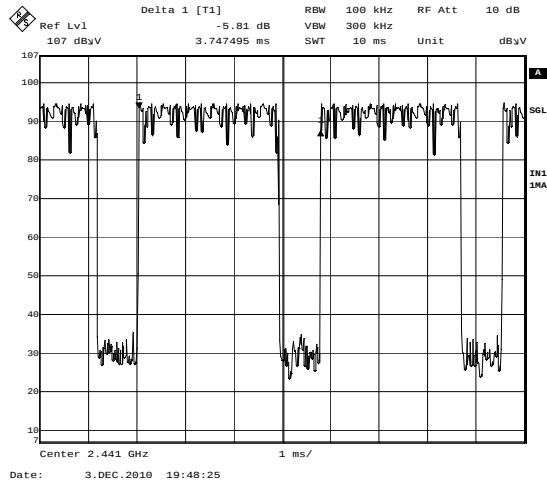
Spurious emission (Radiated)

DH5,

VBW (AV) Calculation

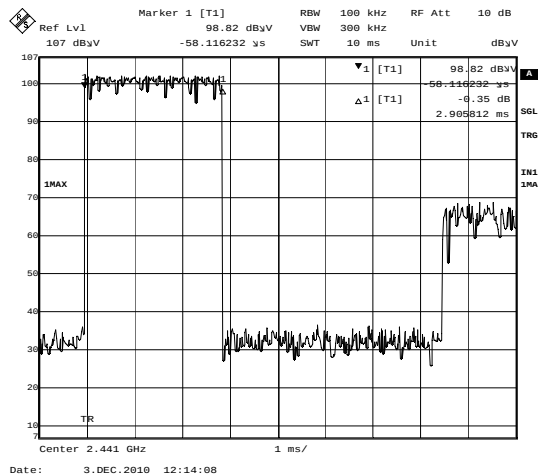
VBW: $1/x = 266\text{Hz} < 300\text{Hz}$

x: (Tx on+Tx off) = 3.75ms



Worst 100ms,

***1) Dwell time factor = $20\log(2.91*2/100) = -24.70\text{dB}$**



*1) ON time of some channel during 100ms: Twice
This is the worst case in hopping sequence of Bluetooth.

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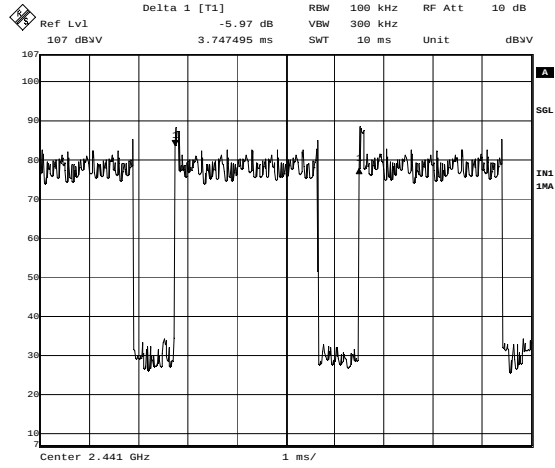
Spurious emission (Radiated)

3-DH5,

VBW (AV) Calculation

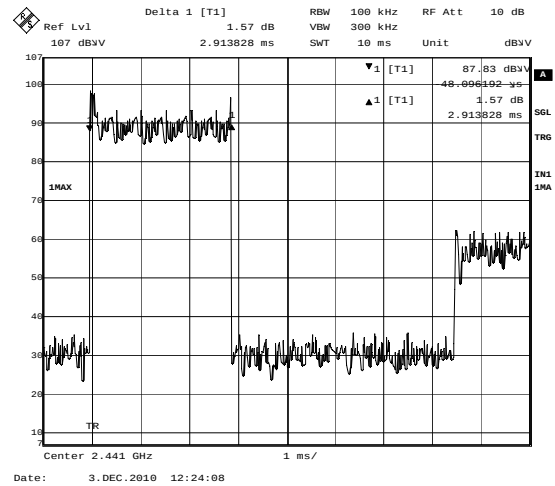
VBW: $1/x = 266\text{Hz} < 300\text{Hz}$

x: (Tx on+Tx off) = 3.75ms



Worst 100ms,

*1) Dwell time factor = $20\log(2.914*2/100) = -24.68\text{dB}$



*1) ON time of some channel during 100ms: Twice
This is the worst case in hopping sequence of Bluetooth.

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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	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
STR-03	Test Receiver	Rohde & Schwarz	ESI40	100054/040	RE/CE	2010/07/21 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE/CE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV	-	RE/CE	-
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2009/12/04 * 12
SAT10-04	Attenuator(above1GHz)	Agilent	8493C-010	74863	RE	2010/03/05 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2010/02/06 * 12
SAT6-03	Attenuator	JFW	50HF-006N	-	RE	2010/02/06 * 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	2010/04/02 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2010/10/15 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2010/09/13 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2010/03/29 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2010/03/02 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104A	46291/4A	RE	2010/03/02 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2010/04/02 * 12
SLS-06	LISN	Schwarzbeck	NSLK8126	8126440	CE	2010/03/29 * 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-03	Terminator	TME	CT-01 BP	-	CE	2010/01/08 * 12
SCC-01	Coaxial Cable	Fujikura	5D2W	-	CE	2010/01/08 * 12
SHF-01	Highpass Filter	Rohde & Schwarz	EZ-25	100021	CE	2010/03/29 * 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 traceable calibrations . Each calibration is traceable to the national or international standards .

Test Item :

CE: Conducted emission,

RE: Radiated emission,