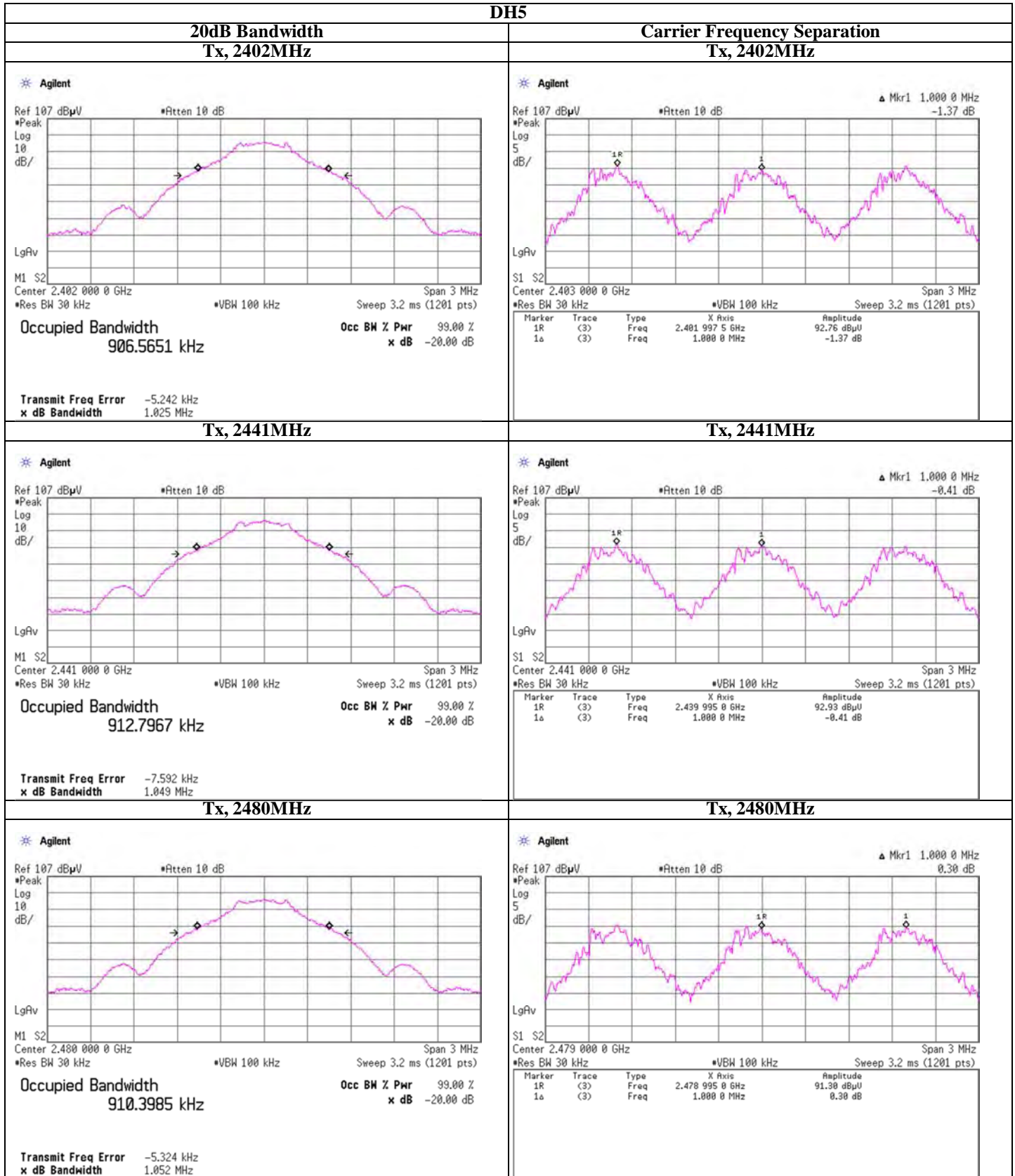

20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date 2011/6/24
 Temperature / Humidity 25deg.C 43% RH
 Engineer Makoto Hosaka
 Mode Tx

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	1.025	1.000	≥ 0.683
DH5	2441.0	1.049	1.000	≥ 0.699
DH5	2480.0	1.052	1.000	≥ 0.701
3DH5	2402.0	1.333	1.000	≥ 0.889
3DH5	2441.0	1.329	1.000	≥ 0.886
3DH5	2480.0	1.338	1.000	≥ 0.892
Inquiry	2441.0	0.843	2.000	≥ 0.562

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).
 No limit applies to 20dB Bandwidth.

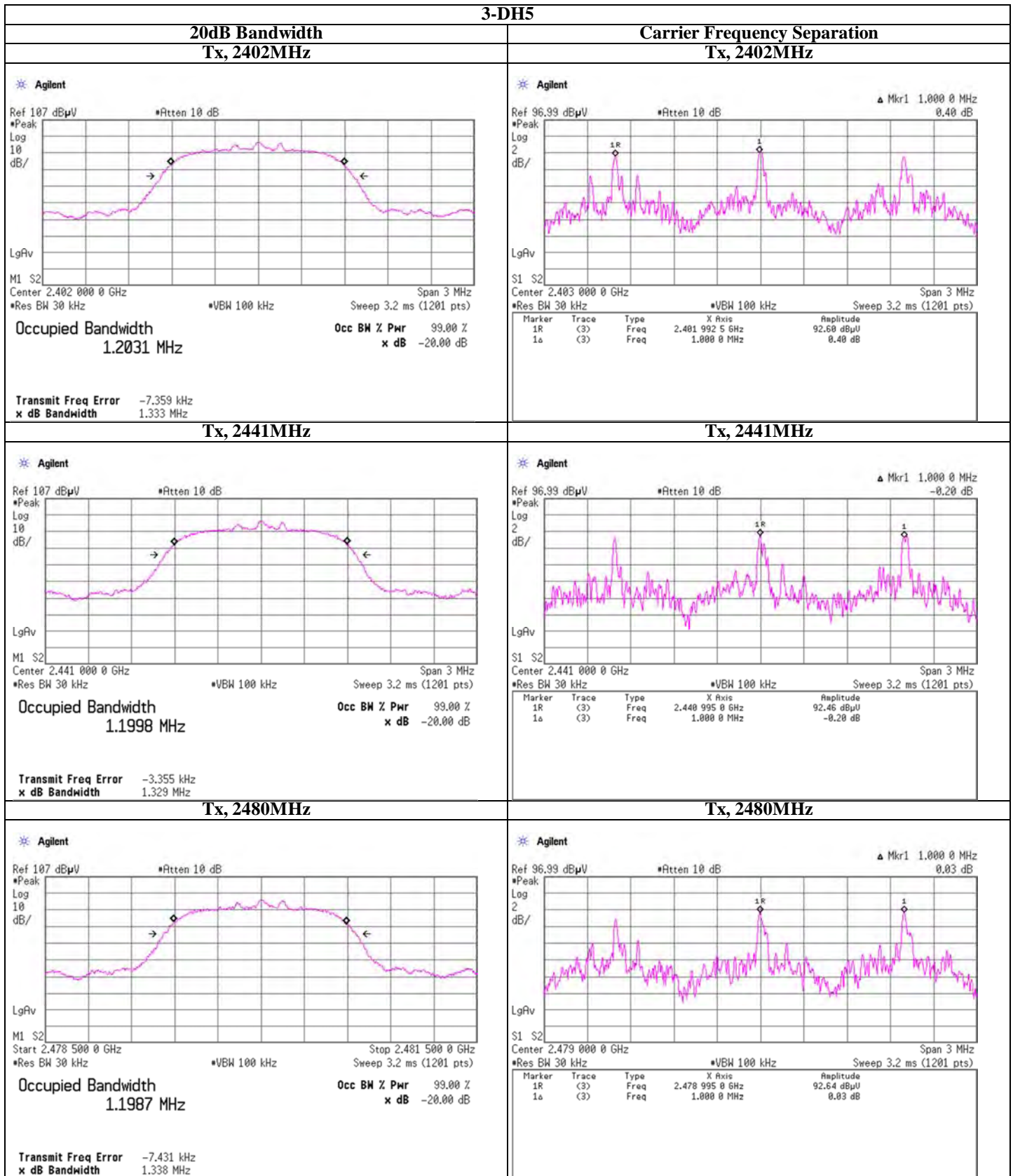
20dB Bandwidth and Carrier Frequency Separation



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Shonan EMC Lab.

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Facsimile : +81 463 50 6401

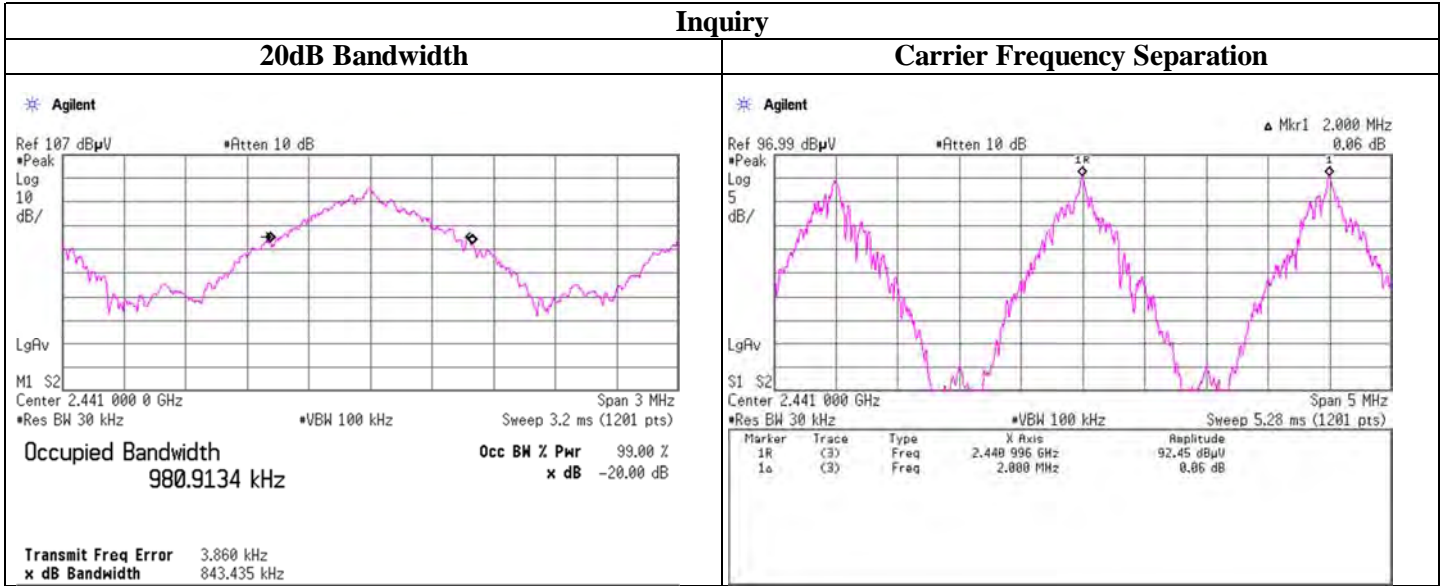
20dB Bandwidth and Carrier Frequency Separation



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 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

20dB Bandwidth and Carrier Frequency Separation



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Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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Facsimile : +81 463 50 6401

Number of Hopping Frequency (Conducted)

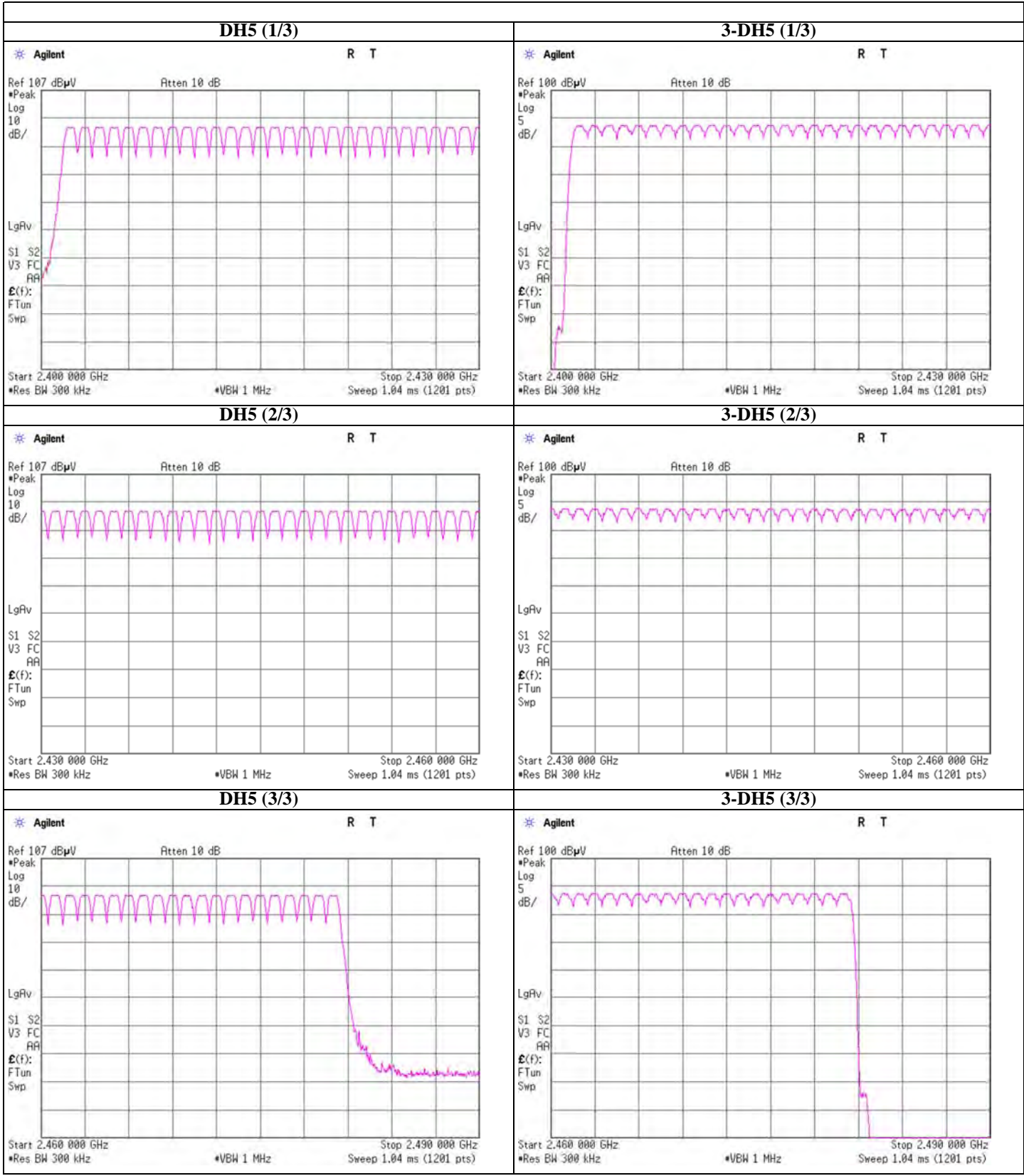
Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date 2011/7/1
Temperature / Humidity 25deg.C 47% RH
Engineer Shinichi Takano
Mode Tx,

Mode	Number of Channel [times]	Limit [times]
DH5	79	>=15
3-DH5	79	>=15
Inquiry	32	>=15

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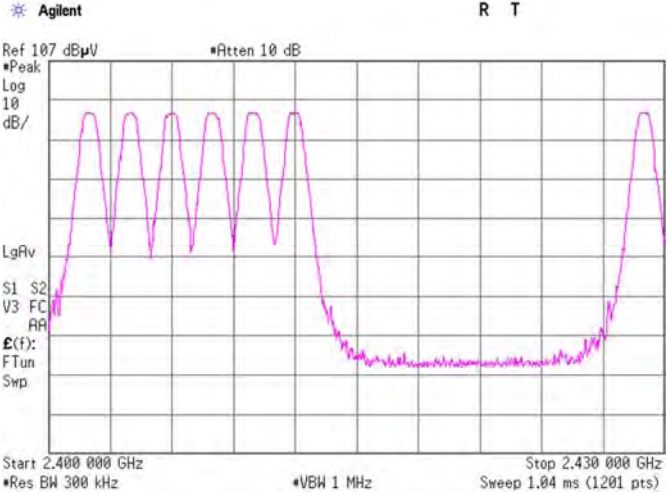
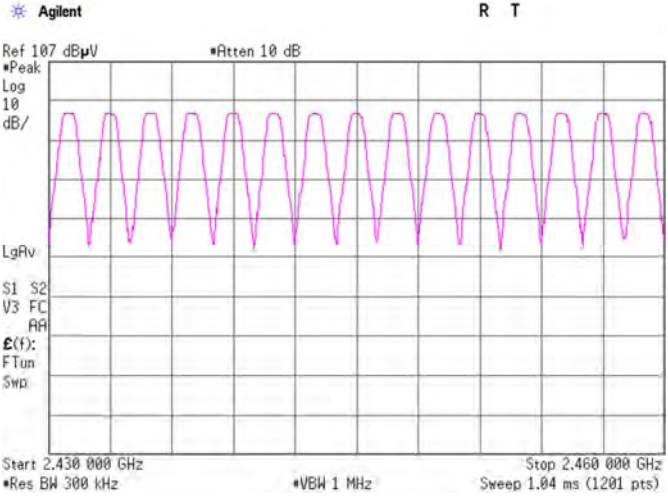
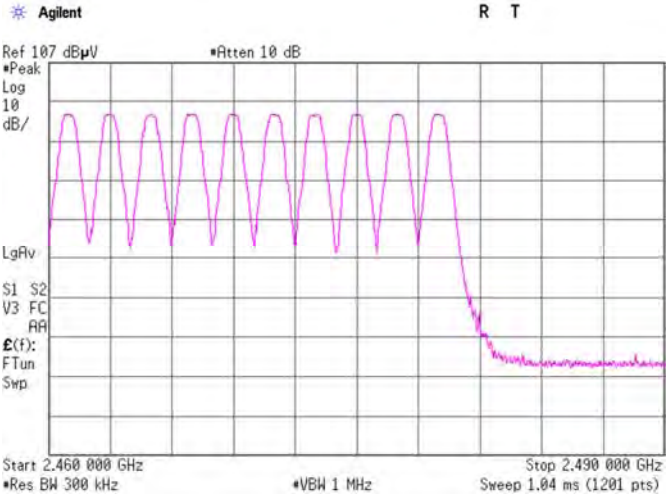
Number of Hopping Frequency



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Number of Hopping Frequency

Inquiry (1/3)	
 <p>Agilent R T</p> <p>Ref 107 dBµV *Atten 10 dB</p> <p>*Peak Log 10 dB/</p> <p>LgRv</p> <p>S1 S2 V3 FC RA</p> <p>E(f): FTun Swp</p> <p>Start 2.400 000 GHz Stop 2.430 000 GHz</p> <p>*Res BW 300 kHz *VBW 1 MHz Sweep 1.04 ms (1201 pts)</p>	
Inquiry (2/3)	
 <p>Agilent R T</p> <p>Ref 107 dBµV *Atten 10 dB</p> <p>*Peak Log 10 dB/</p> <p>LgRv</p> <p>S1 S2 V3 FC RA</p> <p>E(f): FTun Swp</p> <p>Start 2.430 000 GHz Stop 2.460 000 GHz</p> <p>*Res BW 300 kHz *VBW 1 MHz Sweep 1.04 ms (1201 pts)</p>	
Inquiry (3/3)	
 <p>Agilent R T</p> <p>Ref 107 dBµV *Atten 10 dB</p> <p>*Peak Log 10 dB/</p> <p>LgRv</p> <p>S1 S2 V3 FC RA</p> <p>E(f): FTun Swp</p> <p>Start 2.460 000 GHz Stop 2.490 000 GHz</p> <p>*Res BW 300 kHz *VBW 1 MHz Sweep 1.04 ms (1201 pts)</p>	

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Facsimile : +81 463 50 6401

Dwell Time (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date 2011/7/1
 Temperature / Humidity 25deg.C 47% RH
 Engineer Shinichi Takano
 Mode Tx,

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	48.4 times / 5.0 sec. x 31.6 sec. = 306 times	0.455	139	400
DH3	25.8 times / 5.0 sec. x 31.6 sec. = 164 times	1.713	281	400
DH5	17.6 times / 5.0 sec. x 31.6 sec. = 112 times	2.961	332	400
3DH1	49.6 times / 5.0 sec. x 31.6 sec. = 314 times	0.452	142	400
3DH3	27.2 times / 5.0 sec. x 31.6 sec. = 172 times	1.705	293	400
3DH5	18.0 times / 5.0 sec. x 31.6 sec. = 114 times	2.953	337	400
Inquiry	100.0 times / 1.0 sec. x 12.8 sec. = 1280 times	0.144	184	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	47	49	49	49	48.4
DH3	25	24	26	26	28	25.8
DH5	17	17	19	17	18	17.6
3DH1	50	48	52	49	49	49.6
3DH3	26	27	27	28	28	27.2
3DH5	17	18	18	18	19	18

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

UL Japan, Inc.
Shonan EMC Lab.

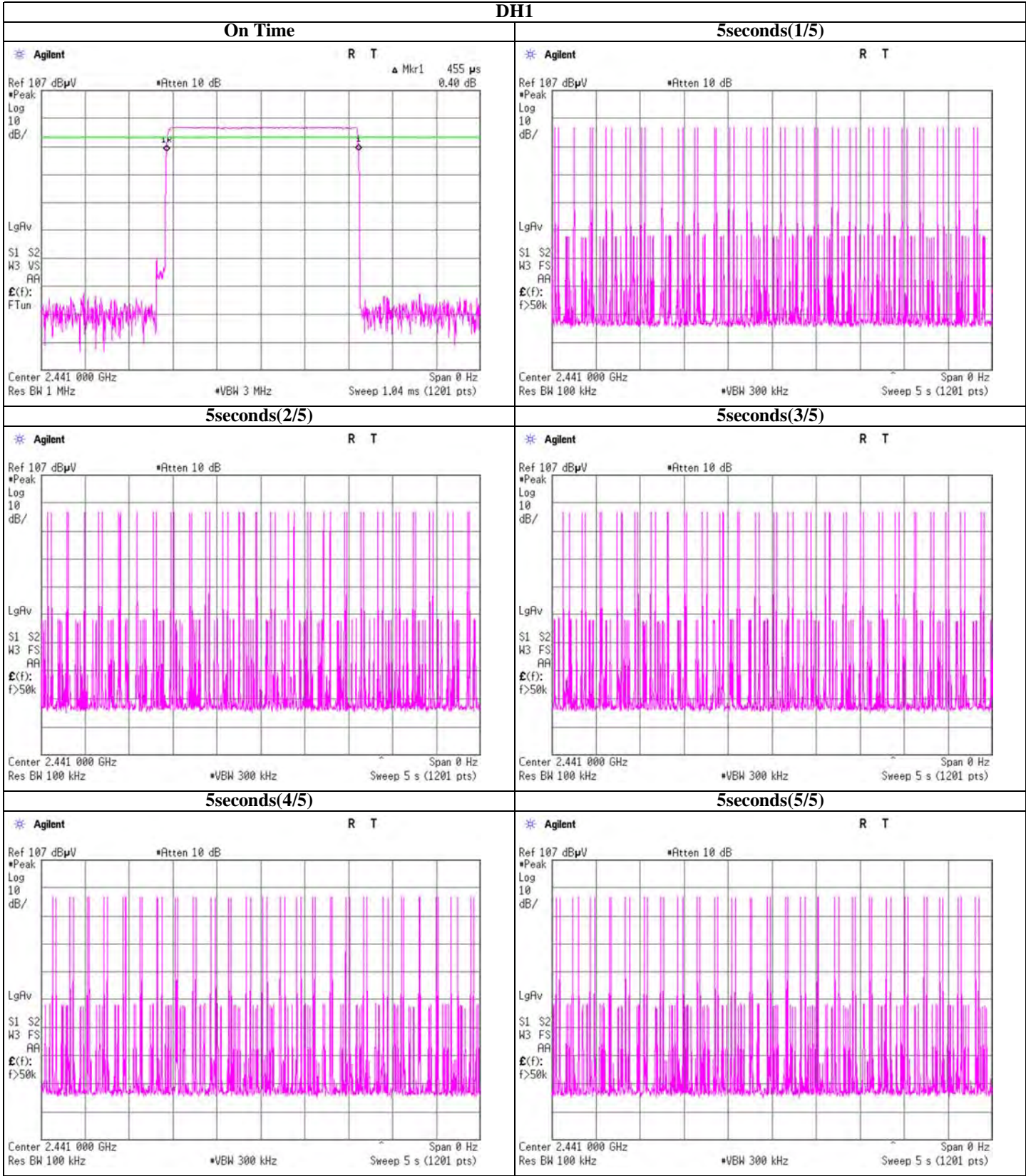
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Dwell time

DH1

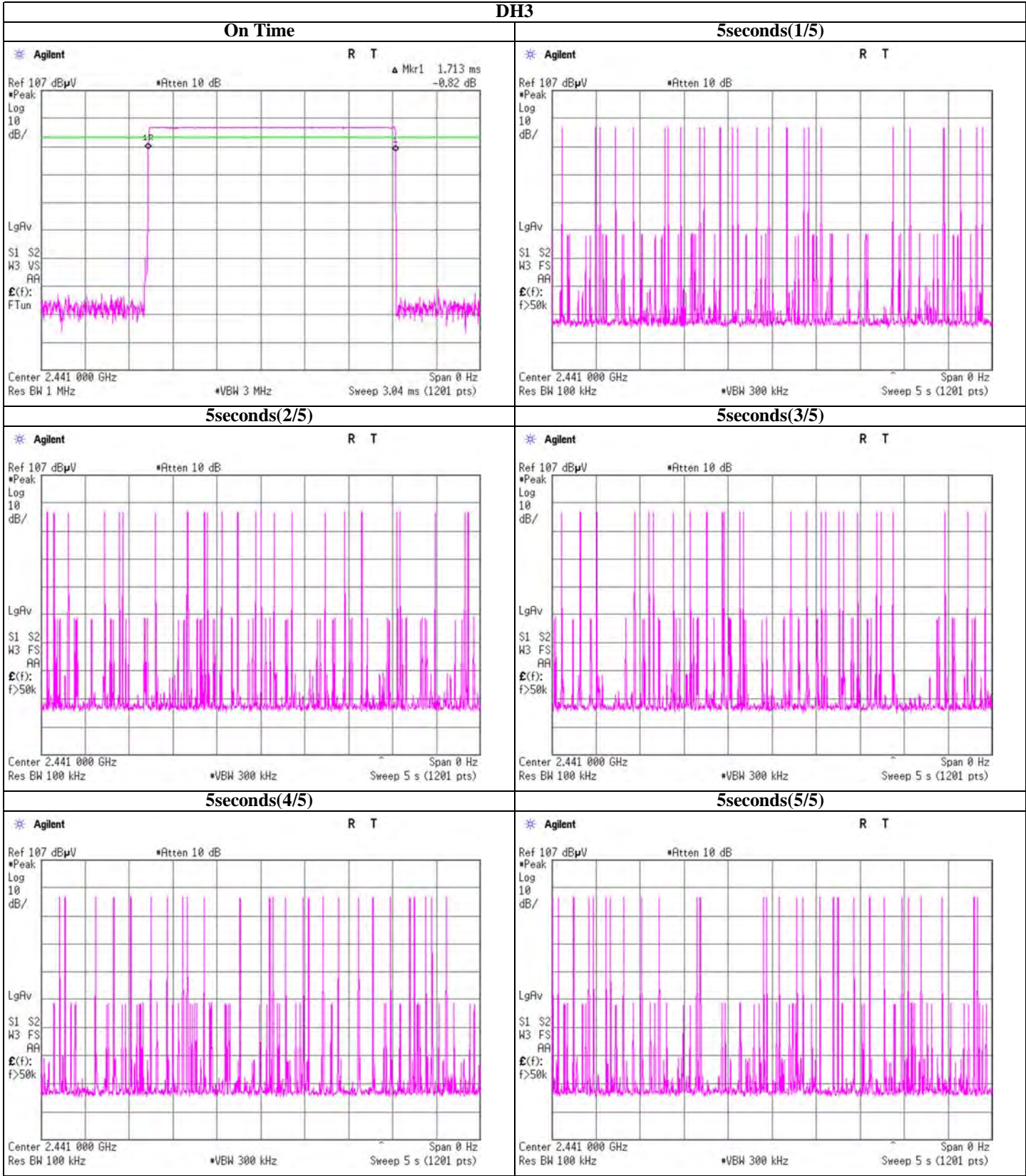


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Dwell time

DH3

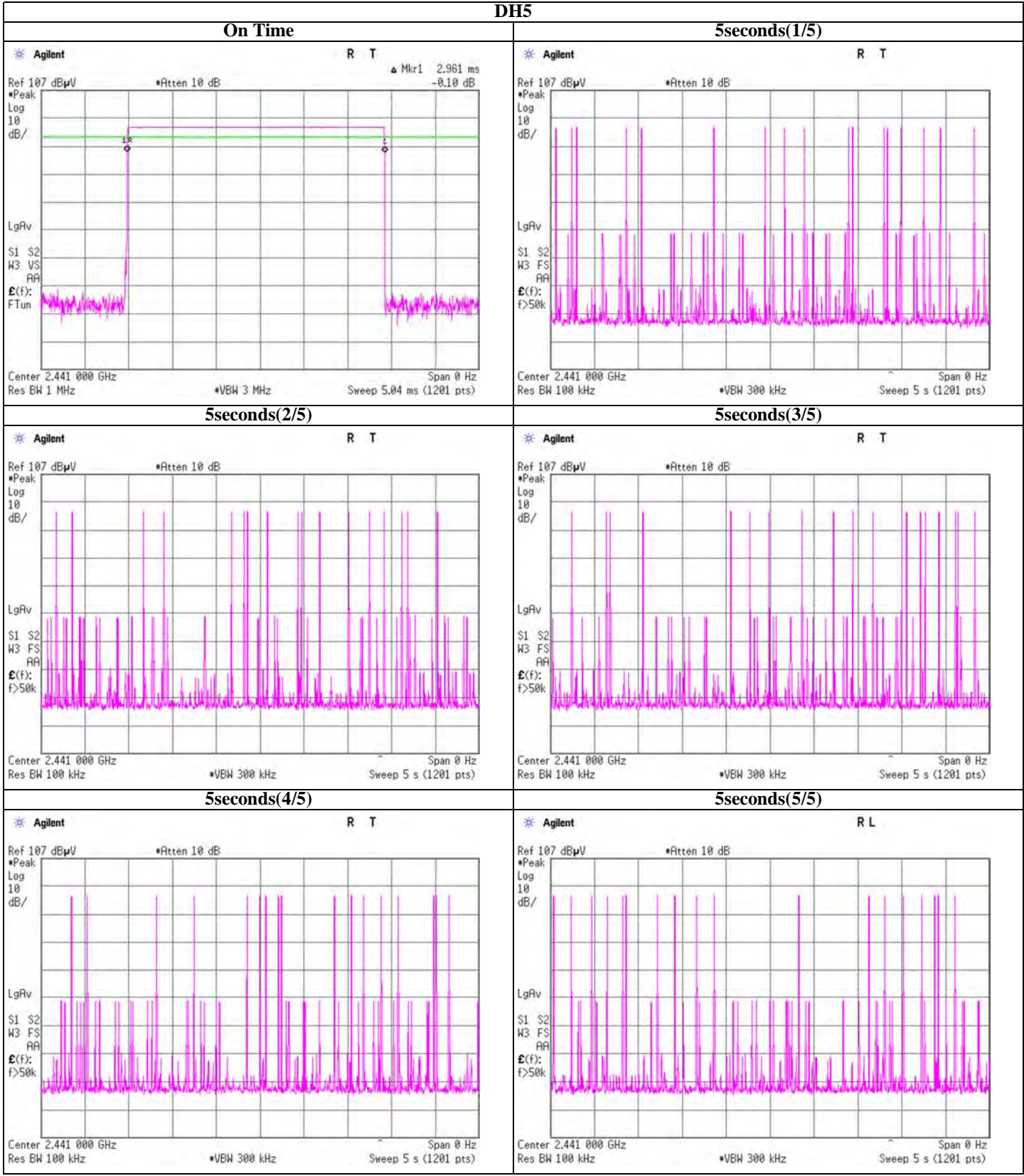


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Telephone : +81 463 50 6400
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Dwell time

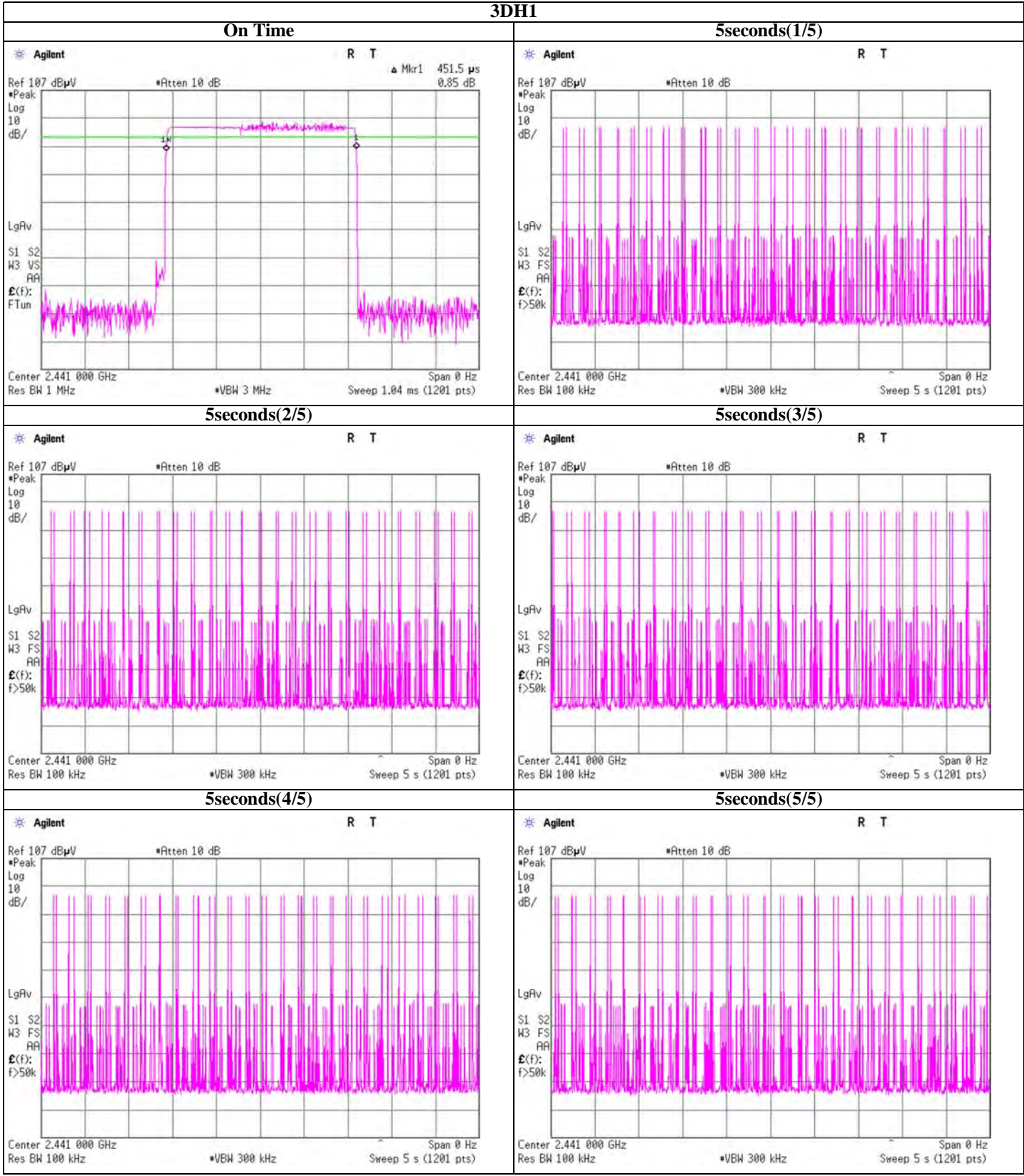
DH5



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Dwell time

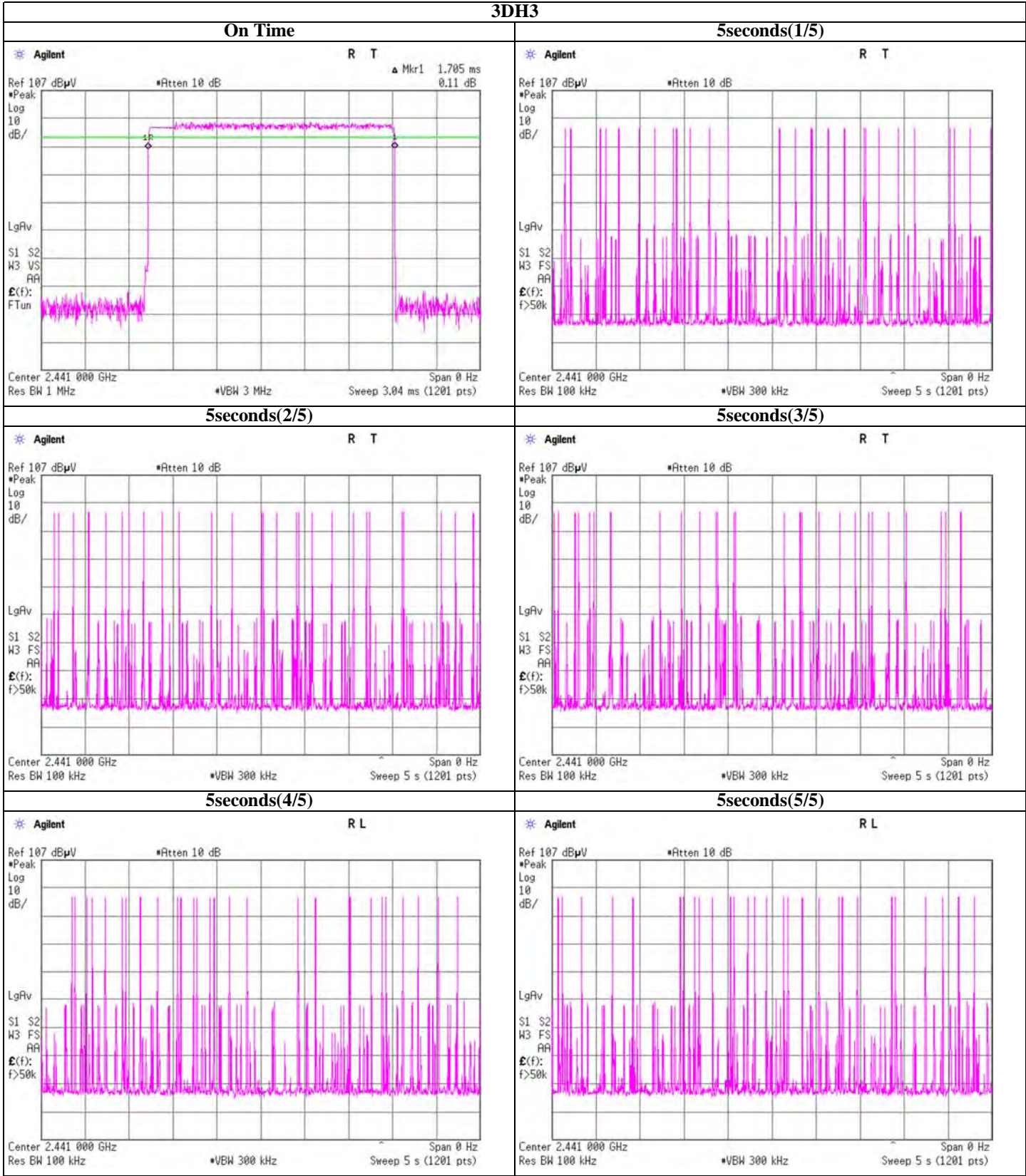


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Dwell time

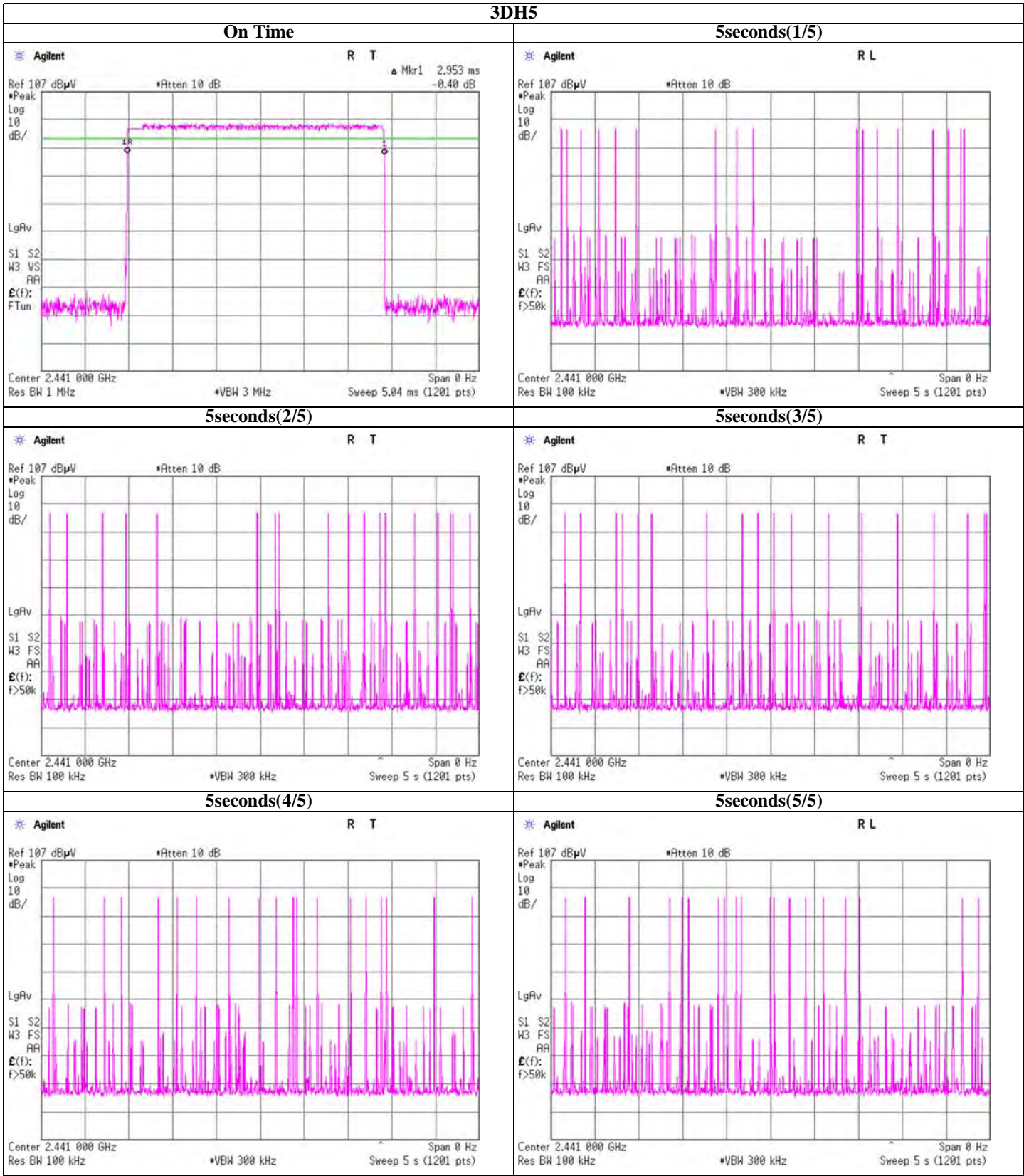
3DH3



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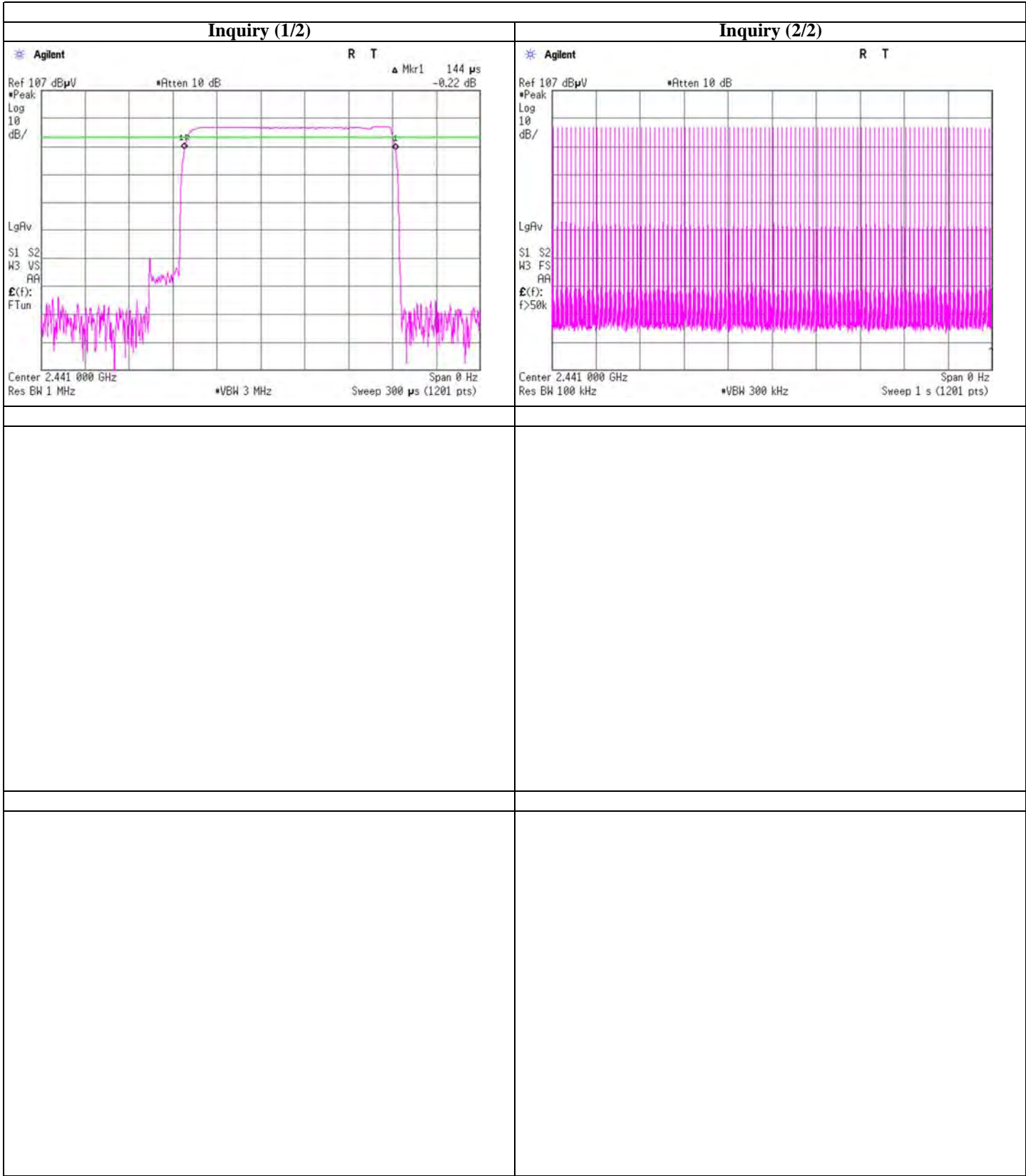
Dwell time



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Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Dwell time



**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

Peak Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date 2011/7/1
 Temperature / Humidity 25deg.C 47% RH
 Engineer Shinichi Takano
 Mode Tx,

BDR (DH5)

Ch	Freq. [MHz]	P/M (PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2402.0	-12.90	1.12	9.97	-1.81	0.66	20.97	125	22.78
Mid	2441.0	-12.76	1.09	9.97	-1.70	0.68	20.97	125	22.67
High	2480.0	-12.82	1.09	9.97	-1.76	0.67	20.97	125	22.73

EDR (2-DH5)

Ch	Freq. [MHz]	P/M (PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2402.0	-11.39	1.12	9.97	-0.30	0.93	20.97	125	21.27
Mid	2441.0	-11.24	1.09	9.97	-0.18	0.96	20.97	125	21.15
High	2480.0	-11.29	1.09	9.97	-0.23	0.95	20.97	125	21.20

EDR (3-DH5)

Ch	Freq. [MHz]	P/M (PK) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2402.0	-10.97	1.12	9.97	0.12	1.03	20.97	125	20.85
Mid	2441.0	-10.86	1.09	9.97	0.20	1.05	20.97	125	20.77
High	2480.0	-10.98	1.09	9.97	0.08	1.02	20.97	125	20.89

Sample Calculation:

Result = Reading + Cable Loss + 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.

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 and No.1 Semi Anechoic Chamber
Date 2011/06/25, 2011/07/05
Temperature / Humidity 25deg.C 61%RH (6/25) 24deg.C 65%RH (7/5)
Engineer Hikaru Shirasawa
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.	117.945	QP	35.5	13.0	8.1	31.8	24.8	43.5	18.7	300	129	
Hori.	624.107	QP	38.1	19.4	8.7	32.0	34.2	46.0	11.8	156	222	
Hori.	2390.000	PK	43.2	27.5	13.8	37.8	46.7	73.9	27.2	119	252	
Hori.	2400.000	PK	56.6	27.5	13.8	37.8	60.1	73.9	13.8	119	252	
Hori.	4804.000	PK	45.0	31.5	6.0	36.6	45.9	73.9	28.0	100	94	
Hori.	7206.000	PK	47.9	36.4	7.4	38.4	53.3	73.9	20.6	100	359	
Hori.	9608.000	PK	45.3	37.9	8.7	37.1	54.8	73.9	19.1	100	2	
Hori.	12010.000	PK	46.8	39.4	10.2	37.9	58.5	73.9	15.4	100	352	
Hori.	2390.000	AV	32.2	27.5	13.8	37.8	35.7	53.9	18.2	119	252	VBW:270Hz
Hori.	2400.000	AV	40.5	27.5	13.8	37.8	44.0	53.9	9.9	119	252	VBW:270Hz
Hori.	4804.000	AV	33.3	31.5	6.0	36.6	34.2	53.9	19.7	100	94	VBW:270Hz
Hori.	7206.000	AV	33.9	36.4	7.4	38.4	39.3	53.9	14.6	100	359	VBW:270Hz
Hori.	9608.000	AV	32.0	37.9	8.7	37.1	41.5	53.9	12.4	100	2	VBW:270Hz
Hori.	12010.000	AV	33.9	39.4	10.2	37.9	45.6	53.9	8.3	100	352	VBW:270Hz
Vert.	188.010	QP	27.7	16.6	8.9	31.8	21.4	43.5	22.1	100	2	
Vert.	623.995	QP	36.5	19.4	8.7	32.0	32.6	46.0	13.4	100	244	
Vert.	2390.000	PK	43.6	27.5	13.8	37.8	47.1	73.9	26.8	100	272	
Vert.	2400.000	PK	52.2	27.5	13.8	37.8	55.7	73.9	18.2	100	272	
Vert.	4804.000	PK	44.0	31.5	6.0	36.6	44.9	73.9	29.0	100	269	
Vert.	7206.000	PK	46.9	36.4	7.4	38.4	52.3	73.9	21.6	100	359	
Vert.	9608.000	PK	44.8	37.9	8.7	37.1	54.3	73.9	19.6	100	102	
Vert.	12010.000	PK	46.0	39.4	10.2	37.9	57.7	73.9	16.2	100	0	
Vert.	2390.000	AV	31.7	27.5	13.8	37.8	35.2	53.9	18.7	100	272	VBW:270Hz
Vert.	2400.000	AV	37.2	27.5	13.8	37.8	40.7	53.9	13.2	100	272	VBW:270Hz
Vert.	4804.000	AV	33.0	31.5	6.0	36.6	33.9	53.9	20.0	100	269	VBW:270Hz
Vert.	7206.000	AV	34.4	36.4	7.4	38.4	39.8	53.9	14.1	100	359	VBW:270Hz
Vert.	9608.000	AV	32.2	37.9	8.7	37.1	41.7	53.9	12.2	100	102	VBW:270Hz
Vert.	12010.000	AV	34.1	39.4	10.2	37.9	45.8	53.9	8.1	100	0	VBW:270Hz

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

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

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 and No.1 Semi Anechoic Chamber
Date 2011/06/25, 2011/07/05
Temperature / Humidity 25deg.C 61%RH (6/25) 24deg.C 65%RH (7/5)
Engineer Hikaru Shirasawa
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.	117.462	QP	34.8	12.9	8.1	31.8	24	43.5	19.5	271	141	
Hori.	623.999	QP	37.6	19.4	8.7	32.0	33.7	46.0	12.3	150	233	
Hori.	832.211	QP	33	21.3	9.7	31.8	32.2	46.0	13.8	100	200	
Hori.	4882.000	PK	43.5	31.7	6	36.6	44.6	73.9	29.3	100	220	
Hori.	7323.000	PK	46.3	36.7	7.4	38.4	52	73.9	21.9	100	359	
Hori.	9764.000	PK	44.4	38.2	8.7	37.1	54.2	73.9	19.7	100	1	
Hori.	12205.000	PK	45.8	39.2	10.3	38	57.3	73.9	16.6	106	359	
Hori.	4882.000	AV	35	31.7	6	36.6	36.1	53.9	17.8	100	220	VBW:270Hz
Hori.	7323.000	AV	33.5	36.7	7.4	38.4	39.2	53.9	14.7	100	359	VBW:270Hz
Hori.	9764.000	AV	31.8	38.2	8.7	37.1	41.6	53.9	12.3	100	1	VBW:270Hz
Hori.	12205.000	AV	33.1	39.2	10.3	38	44.6	53.9	9.3	106	359	VBW:270Hz
Vert.	188.195	QP	27.4	16.6	8.9	31.8	21.1	43.5	22.4	100	193	
Vert.	623.995	QP	36.6	19.4	8.7	32	32.7	46	13.3	100	239	
Vert.	4882.000	PK	47.2	31.7	6	36.6	48.3	73.9	25.6	100	151	
Vert.	7323.000	PK	45.7	36.7	7.4	38.4	51.4	73.9	22.5	100	359	
Vert.	9764.000	PK	44.6	38.2	8.7	37.1	54.4	73.9	19.5	100	2	
Vert.	12205.000	PK	46	39.2	10.3	38	57.5	73.9	16.4	100	358	
Vert.	4882.000	AV	40.1	31.7	6	36.6	41.2	53.9	12.7	100	151	VBW:270Hz
Vert.	7323.000	AV	33.4	36.7	7.4	38.4	39.1	53.9	14.8	100	359	VBW:270Hz
Vert.	9764.000	AV	31.7	38.2	8.7	37.1	41.5	53.9	12.4	100	2	VBW:270Hz
Vert.	12205.000	AV	33.1	39.2	10.3	38.0	44.6	53.9	9.3	100	358	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).

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 and No.1 Semi Anechoic Chamber
Date 2011/06/25, 2011/07/05
Temperature / Humidity 25deg.C 61%RH (6/25) 24deg.C 65%RH (7/5)
Engineer Hikaru Shirasawa
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.	117.981	QP	31.8	13	8.1	31.8	21.1	43.5	22.4	150	289	
Hori.	416.001	QP	32	16.8	7.7	31.8	24.7	46	21.3	100	227	
Hori.	623.997	QP	38.3	19.4	8.7	32.0	34.4	46.0	11.6	150	236	
Hori.	2483.500	PK	47.3	27.6	13.7	37.6	51	73.9	22.9	117	337	
Hori.	2483.892	PK	47.4	27.6	13.7	37.6	51.1	73.9	22.8	117	337	
Hori.	4960.000	PK	45.9	31.9	6	36.5	47.3	73.9	26.6	100	92	
Hori.	7440.000	PK	46	36.9	7.3	38.4	51.8	73.9	22.1	100	359	
Hori.	9920.000	PK	45.2	38.4	8.8	37.2	55.2	73.9	18.7	100	0	
Hori.	12400.000	PK	45.7	39.1	10.3	38	57.1	73.9	16.8	100	358	
Hori.	2483.500	AV	35.1	27.6	13.7	37.6	38.8	53.9	15.1	117	337	VBW:270Hz
Hori.	2483.892	AV	35.1	27.6	13.7	37.6	38.8	53.9	15.1	117	337	VBW:270Hz
Hori.	4960.000	AV	34.6	31.9	6	36.5	36	53.9	17.9	100	92	VBW:270Hz
Hori.	7440.000	AV	34.4	36.9	7.3	38.4	40.2	53.9	13.7	100	359	VBW:270Hz
Hori.	9920.000	AV	32	38.4	8.8	37.2	42	53.9	11.9	100	0	VBW:270Hz
Hori.	12400.000	AV	32.9	39.1	10.3	38	44.3	53.9	9.6	100	358	VBW:270Hz
Vert.	194.990	QP	26.6	16.7	8.9	31.8	20.4	43.5	23.1	100	195	
Vert.	624.003	QP	36.1	19.4	8.7	32	32.2	46	13.8	100	247	
Vert.	2483.500	PK	46.1	27.6	13.7	37.6	49.8	73.9	24.1	100	267	
Vert.	2483.892	PK	46.5	27.6	13.7	37.6	50.2	73.9	23.7	100	267	
Vert.	4960.000	PK	49.3	31.9	6	36.5	50.7	73.9	23.2	100	153	
Vert.	7440.000	PK	47	36.9	7.3	38.4	52.8	73.9	21.1	100	323	
Vert.	9920.000	PK	45.1	38.4	8.8	37.2	55.1	73.9	18.8	100	357	
Vert.	12400.000	PK	46.2	39.1	10.3	38.0	57.6	73.9	16.3	100	10	
Vert.	2483.500	AV	34.4	27.6	13.7	37.6	38.1	53.9	15.8	100	267	VBW:270Hz
Vert.	2483.892	AV	34.1	27.6	13.7	37.6	37.8	53.9	16.1	100	267	VBW:270Hz
Vert.	4960.000	AV	42.4	31.9	6	36.5	43.8	53.9	10.1	100	153	VBW:270Hz
Vert.	7440.000	AV	34.5	36.9	7.3	38.4	40.3	53.9	13.6	100	323	VBW:270Hz
Vert.	9920.000	AV	32.3	38.4	8.8	37.2	42.3	53.9	11.6	100	357	VBW:270Hz
Vert.	12400.000	AV	33.3	39.1	10.3	38	44.7	53.9	9.2	100	10	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).

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 and No.1 Semi Anechoic Chamber
Date 2011/06/25, 2011/07/05
Temperature / Humidity 25deg.C 61%RH (6/25) 24deg.C 65%RH (7/5)
Engineer Hikaru Shirasawa
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.	117.710	QP	36.0	12.9	8.1	31.8	25.2	43.5	18.3	164	295	
Hori.	415.989	QP	38.3	16.8	7.7	31.8	31.0	46.0	15.0	100	230	
Hori.	624.013	QP	38.5	19.4	8.7	32.0	34.6	46.0	11.4	150	213	
Hori.	832.004	QP	32.5	21.3	9.7	31.8	31.7	46.0	14.3	100	201	
Hori.	2390.000	PK	44.6	27.5	13.8	37.8	48.1	73.9	25.8	120	351	
Hori.	2400.000	PK	57.9	27.5	13.8	37.8	61.4	73.9	12.5	120	351	
Hori.	4804.000	PK	42.9	31.5	6.0	36.6	43.8	73.9	30.1	100	87	
Hori.	7206.000	PK	47.2	36.4	7.4	38.4	52.6	73.9	21.3	100	359	
Hori.	9608.000	PK	44.0	37.9	8.7	37.1	53.5	73.9	20.4	100	0	
Hori.	12010.000	PK	46.8	39.4	10.2	37.9	58.5	73.9	15.4	100	0	
Hori.	2390.000	AV	32.1	27.5	13.8	37.8	35.6	53.9	18.3	120	351	VBW:270Hz
Hori.	2400.000	AV	45.0	27.5	13.8	37.8	48.5	53.9	5.4	120	351	VBW:270Hz
Hori.	4804.000	AV	32.1	31.5	6.0	36.6	33.0	53.9	20.9	100	87	VBW:270Hz
Hori.	7206.000	AV	34.2	36.4	7.4	38.4	39.6	53.9	14.3	100	359	VBW:270Hz
Hori.	9608.000	AV	32.1	37.9	8.7	37.1	41.6	53.9	12.3	100	0	VBW:270Hz
Hori.	12010.000	AV	33.9	39.4	10.2	37.9	45.6	53.9	8.3	100	0	VBW:270Hz
Vert.	194.117	QP	27.1	16.7	8.9	31.8	20.9	43.5	22.6	100	190	
Vert.	623.999	QP	36.2	19.4	8.7	32.0	32.3	46.0	13.7	100	240	
Vert.	2390.000	PK	44.8	27.5	13.8	37.8	48.3	73.9	25.6	100	272	
Vert.	2400.000	PK	54.0	27.5	13.8	37.8	57.5	73.9	16.4	101	272	
Vert.	4804.000	PK	46.7	31.5	6.0	36.6	47.6	73.9	26.3	101	154	
Vert.	7206.000	PK	46.0	36.4	7.4	38.4	51.4	73.9	22.5	100	358	
Vert.	9608.000	PK	43.3	37.9	8.7	37.1	52.8	73.9	21.1	100	0	
Vert.	12010.000	PK	45.9	39.4	10.2	37.9	57.6	73.9	16.3	100	350	
Vert.	2390.000	AV	32.1	27.5	13.8	37.8	35.6	53.9	18.3	100	272	VBW:270Hz
Vert.	2400.000	AV	41.5	27.5	13.8	37.8	45.0	53.9	8.9	101	272	VBW:270Hz
Vert.	4804.000	AV	38.3	31.5	6.0	36.6	39.2	53.9	14.7	101	154	VBW:270Hz
Vert.	7206.000	AV	34.3	36.4	7.4	38.4	39.7	53.9	14.2	100	358	VBW:270Hz
Vert.	9608.000	AV	32.2	37.9	8.7	37.1	41.7	53.9	12.2	100	0	VBW:270Hz
Vert.	12010.000	AV	34.5	39.4	10.2	37.9	46.2	53.9	7.7	100	350	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).

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 and No.1 Semi Anechoic Chamber
Date 2011/06/25, 2011/07/05
Temperature / Humidity 25deg.C 61%RH (6/25) 24deg.C 65%RH (7/5)
Engineer Hikaru Shirasawa
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.	117.193	QP	35.1	12.9	8.1	31.8	24.3	43.5	19.2	151	140	
Hori.	415.997	QP	36.6	16.8	7.7	31.8	29.3	46.0	16.7	100	237	
Hori.	623.997	QP	37.9	19.4	8.7	32.0	34.0	46.0	12.0	150	210	
Hori.	4882.000	PK	45.2	31.7	6.0	36.6	46.3	73.9	27.6	100	222	VBW:270Hz
Hori.	7323.000	PK	45.2	36.7	7.4	38.4	50.9	73.9	23.0	100	359	VBW:270Hz
Hori.	9764.000	PK	44.4	38.2	8.7	37.1	54.2	73.9	19.7	100	0	VBW:270Hz
Hori.	12205.000	PK	44.9	39.2	10.3	38.0	56.4	73.9	17.5	100	0	VBW:270Hz
Hori.	4882.000	AV	35.3	31.7	6.0	36.6	36.4	53.9	17.5	100	222	VBW:270Hz
Hori.	7323.000	AV	33.6	36.7	7.4	38.4	39.3	53.9	14.6	100	359	VBW:270Hz
Hori.	9764.000	AV	31.9	38.2	8.7	37.1	41.7	53.9	12.2	100	0	VBW:270Hz
Hori.	12205.000	AV	33.2	39.2	10.3	38.0	44.7	53.9	9.2	100	0	VBW:270Hz
Vert.	188.013	QP	27.2	16.6	8.9	31.8	20.9	43.5	22.6	100	191	
Vert.	623.999	QP	36.3	19.4	8.7	32.0	32.4	46.0	13.6	100	243	
Vert.	4882.000	PK	46.7	31.7	6.0	36.6	47.8	73.9	26.1	100	164	VBW:270Hz
Vert.	7323.000	PK	46	36.7	7.4	38.4	51.7	73.9	22.2	100	357	VBW:270Hz
Vert.	9764.000	PK	43.4	38.2	8.7	37.1	53.2	73.9	20.7	100	0	VBW:270Hz
Vert.	12205.000	PK	45.8	39.2	10.3	38.0	57.3	73.9	16.6	100	359	VBW:270Hz
Vert.	4882.000	AV	39.1	31.7	6.0	36.6	40.2	53.9	13.7	100	164	VBW:270Hz
Vert.	7323.000	AV	33.4	36.7	7.4	38.4	39.1	53.9	14.8	100	357	VBW:270Hz
Vert.	9764.000	AV	31.9	38.2	8.7	37.1	41.7	53.9	12.2	100	0	VBW:270Hz
Vert.	12205.000	AV	33	39.2	10.3	38.0	44.5	53.9	9.4	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).

Radiated Emission

Test place UL Japan, Inc. Shonan EMC Lab. No.3 and No.1 Semi Anechoic Chamber
 Date 2011/06/25, 2011/07/05
 Temperature / Humidity 25deg.C 61%RH (6/25) 24deg.C 65%RH (7/5)
 Engineer Hikaru Shirasawa
 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.	117.203	QP	34.5	12.9	8.1	31.8	23.7	43.5	19.8	150	134	
Hori.	416.003	QP	40.0	16.8	7.7	31.8	32.7	46.0	13.3	100	233	
Hori.	624.000	QP	38.5	19.4	8.7	32.0	34.6	46.0	11.4	150	208	
Hori.	2483.500	PK	45.7	27.6	13.7	37.6	49.4	73.9	24.5	116	315	
Hori.	2483.908	PK	45.1	27.6	13.7	37.6	48.8	73.9	25.1	116	315	
Hori.	4960.000	PK	45.7	31.9	6.0	36.5	47.1	73.9	26.8	100	93	
Hori.	7440.000	PK	45.2	36.9	7.3	38.4	51.0	73.9	22.9	100	359	
Hori.	9920.000	PK	42.8	38.4	8.8	37.2	52.8	73.9	21.1	100	2	
Hori.	12400.000	PK	43.2	39.1	10.3	38.0	54.6	73.9	19.3	100	359	
Hori.	2483.500	AV	34.4	27.6	13.7	37.6	38.1	53.9	15.8	116	315	VBW:270Hz
Hori.	2483.908	AV	33.4	27.6	13.7	37.6	37.1	53.9	16.8	116	315	VBW:270Hz
Hori.	4960.000	AV	34.5	31.9	6.0	36.5	35.9	53.9	18.0	100	93	VBW:270Hz
Hori.	7440.000	AV	33.0	36.9	7.3	38.4	38.8	53.9	15.1	100	359	VBW:270Hz
Hori.	9920.000	AV	30.7	38.4	8.8	37.2	40.7	53.9	13.2	100	2	VBW:270Hz
Hori.	12400.000	AV	31.5	39.1	10.3	38.0	42.9	53.9	11.0	100	359	VBW:270Hz
Vert.	187.887	QP	27.4	16.6	8.9	31.8	21.1	43.5	22.4	100	187	
Vert.	623.995	QP	36.6	19.4	8.7	32.0	32.7	46.0	13.3	100	240	
Vert.	2483.500	PK	45.0	27.6	13.7	37.6	48.7	73.9	25.2	100	272	
Vert.	2483.908	PK	44.9	27.6	13.7	37.6	48.6	73.9	25.3	100	272	
Vert.	4960.000	PK	48.6	31.9	6.0	36.5	50.0	73.9	23.9	100	151	
Vert.	7440.000	PK	44.2	36.9	7.3	38.4	50.0	73.9	23.9	100	359	
Vert.	9920.000	PK	43.0	38.4	8.8	37.2	53.0	73.9	20.9	100	0	
Vert.	12400.000	PK	43.1	39.1	10.3	38.0	54.5	73.9	19.4	100	358	
Vert.	2483.500	AV	33.4	27.6	13.7	37.6	37.1	53.9	16.8	100	272	VBW:270Hz
Vert.	2483.908	AV	33.0	27.6	13.7	37.6	36.7	53.9	17.2	100	272	VBW:270Hz
Vert.	4960.000	AV	42.7	31.9	6.0	36.5	44.1	53.9	9.8	100	151	VBW:270Hz
Vert.	7440.000	AV	33.1	36.9	7.3	38.4	38.9	53.9	15.0	100	359	VBW:270Hz
Vert.	9920.000	AV	30.6	38.4	8.8	37.2	40.6	53.9	13.3	100	0	VBW:270Hz
Vert.	12400.000	AV	31.7	39.1	10.3	38.0	43.1	53.9	10.8	100	358	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).

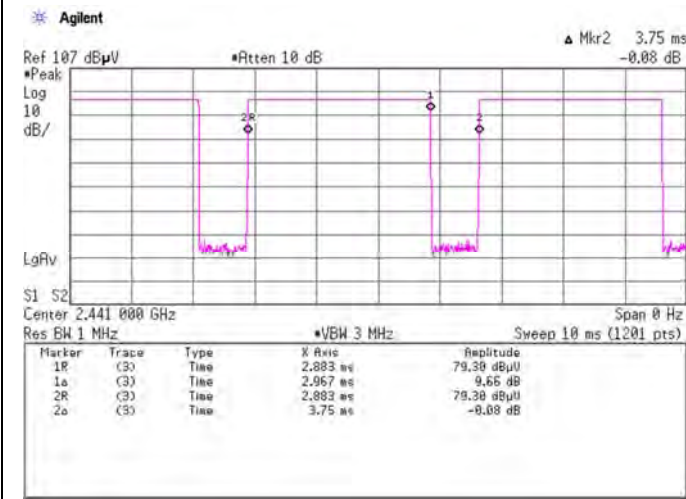
Spurious emission (Radiated)

DH5,

VBW (AV) Calculation

**VBW: $1/x = 267\text{Hz} < 270\text{Hz}$
x: (Tx on+Tx off) = 3.750ms**

**Worst 100ms,
Dwell time factor = $20\log(2.967*2/100) = -24.53\text{dB}$**



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

**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

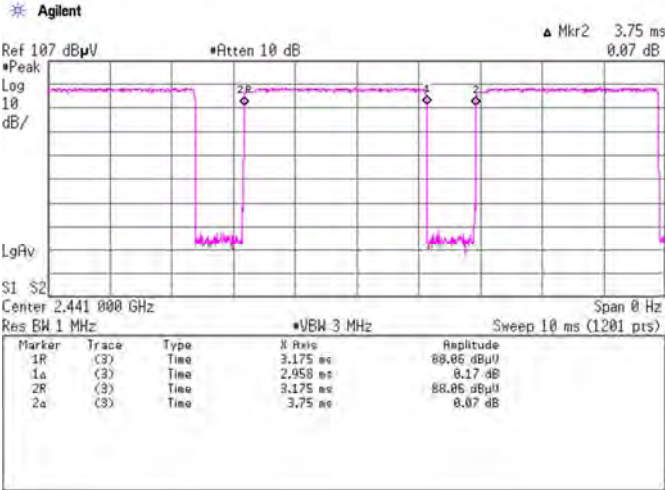
Spurious emission (Radiated)

3-DH5,

VBW (AV) Calculation

VBW: $1/x = 267\text{Hz} < 270\text{Hz}$
x: (Tx on+Tx off) = 3.75ms

Worst 100ms,
Dwell time factor = $20\log(2.958*2/100) = -24.55\text{dB}$



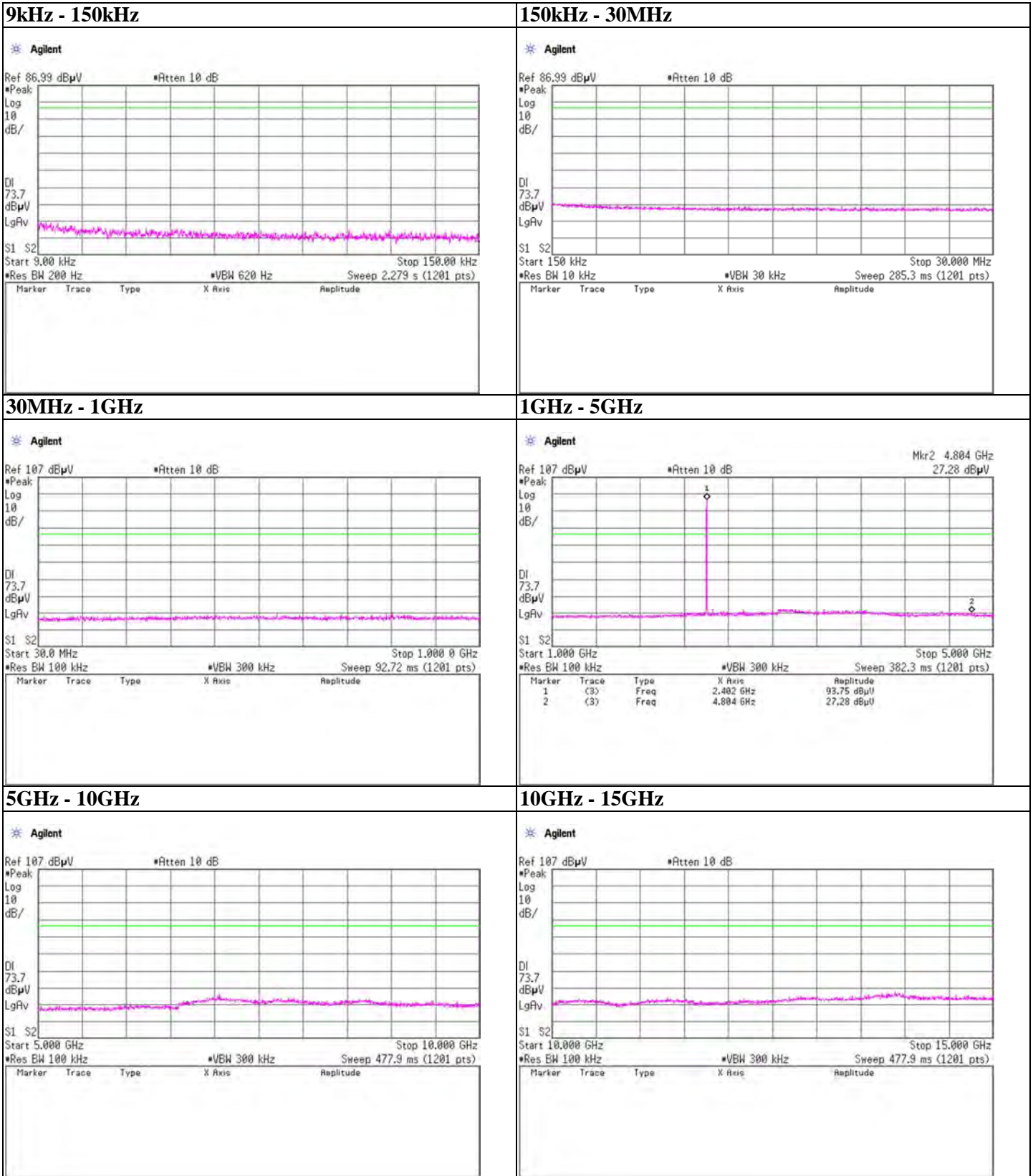
ON time of some channel during 100ms: Twice
 This is the worst case in hopping sequence of Bluetooth.

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)

DH5,
Tx, 2402MHz



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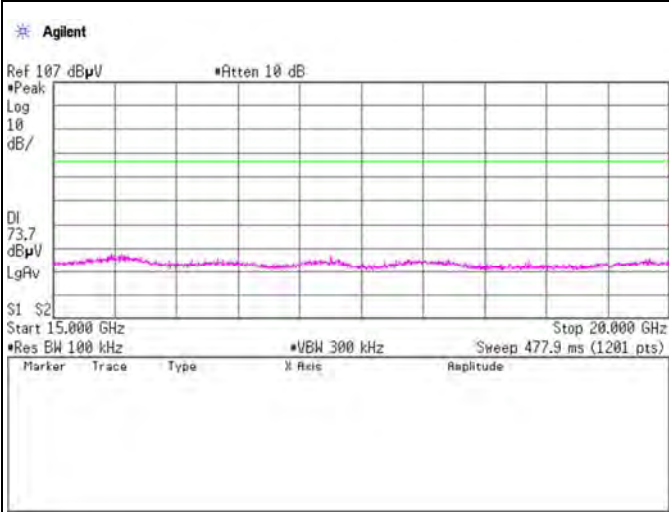
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Spurious emission (Conducted)

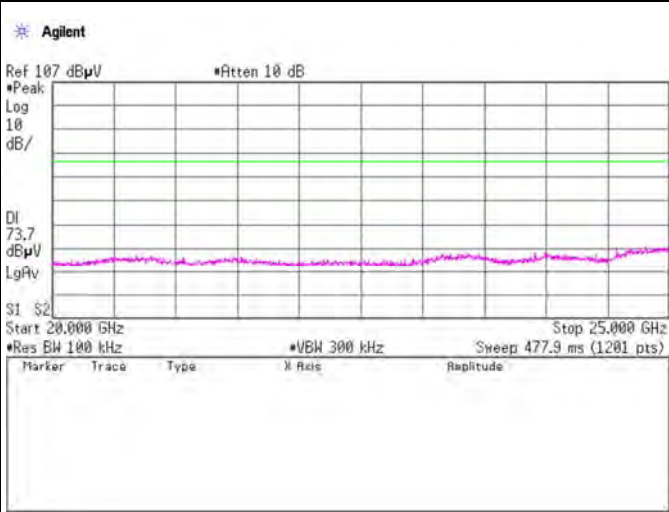
DH5,

Tx, 2402MHz

15GHz - 20GHz



20GHz - 25GHz



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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)

DH5,
Tx, 2441MHz



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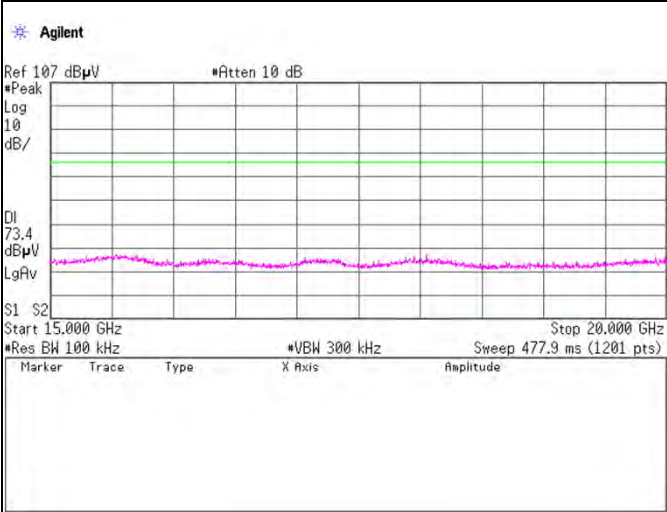
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Spurious emission (Conducted)

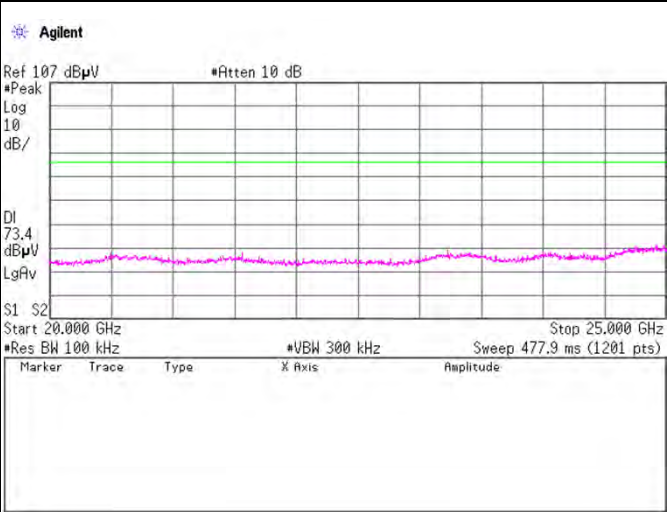
DH5,

Tx, 2441MHz

15GHz - 20GHz



20GHz - 25GHz

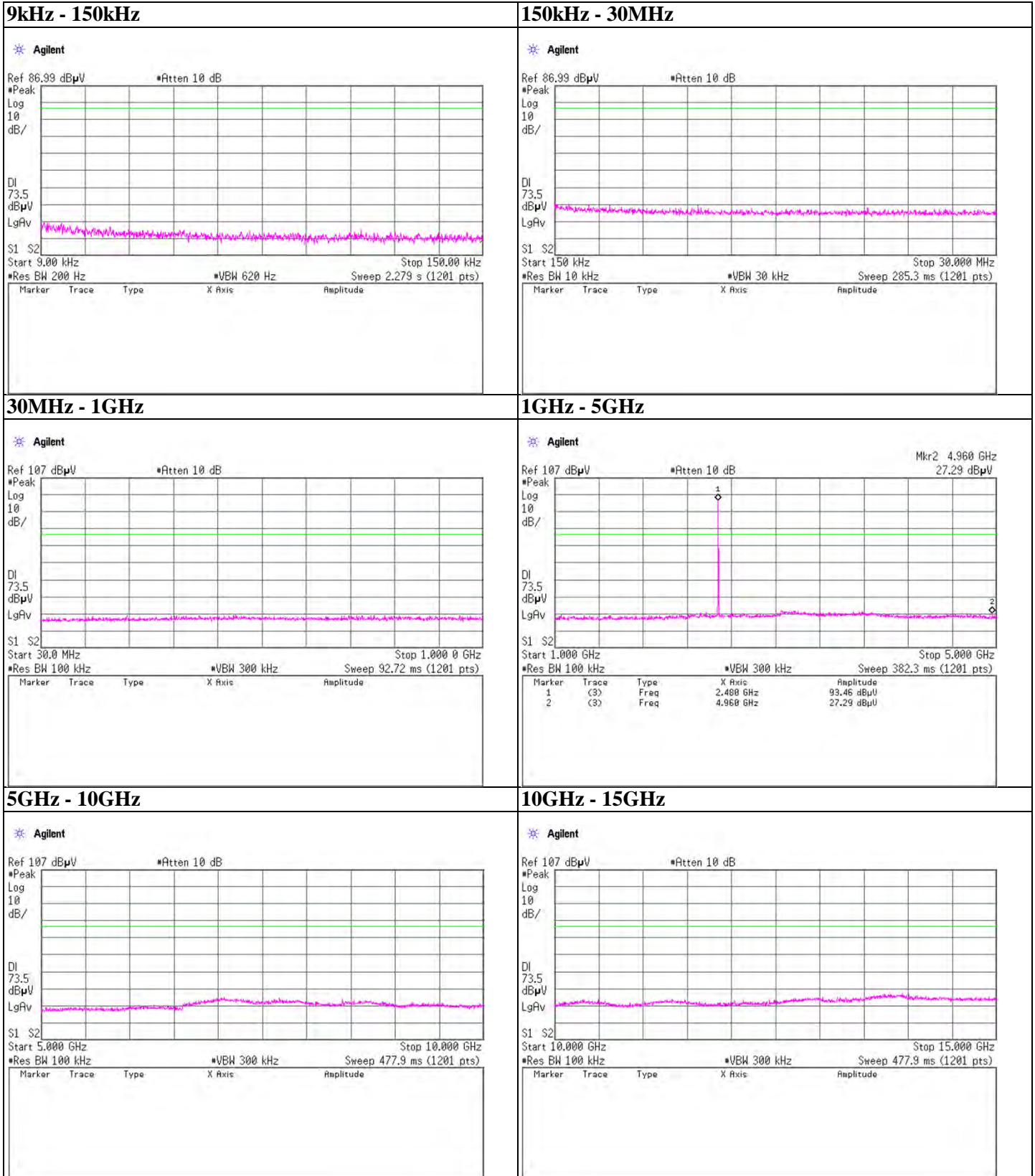


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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Spurious emission (Conducted)

DH5,
Tx, 2480MHz



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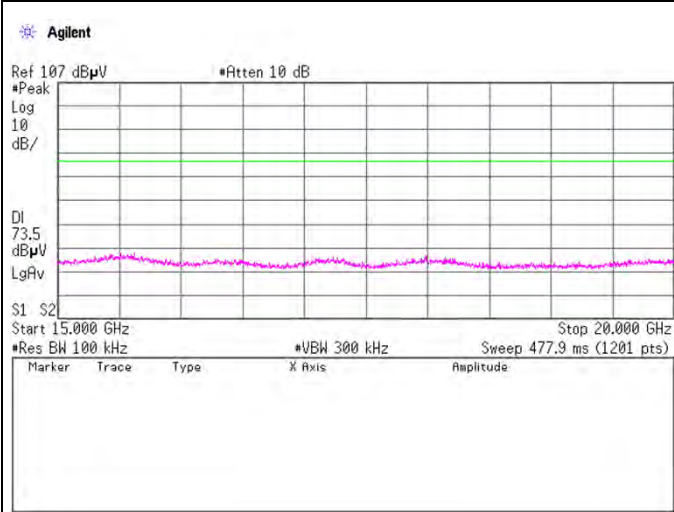
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Spurious emission (Conducted)

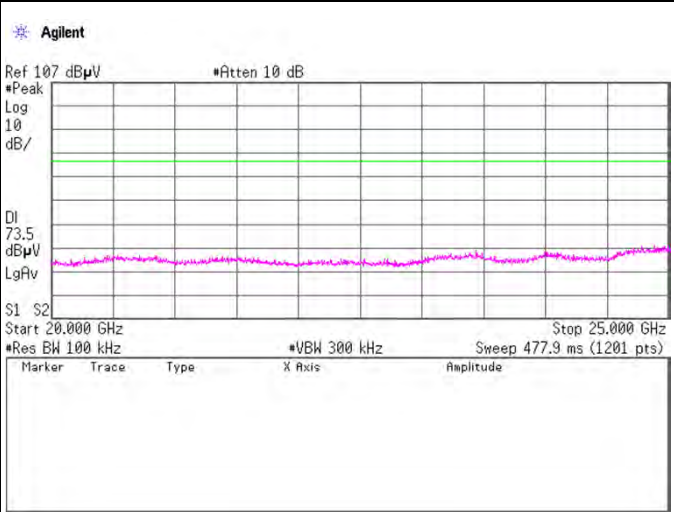
DH5,

Tx, 2480MHz

15GHz - 20GHz



20GHz - 25GHz



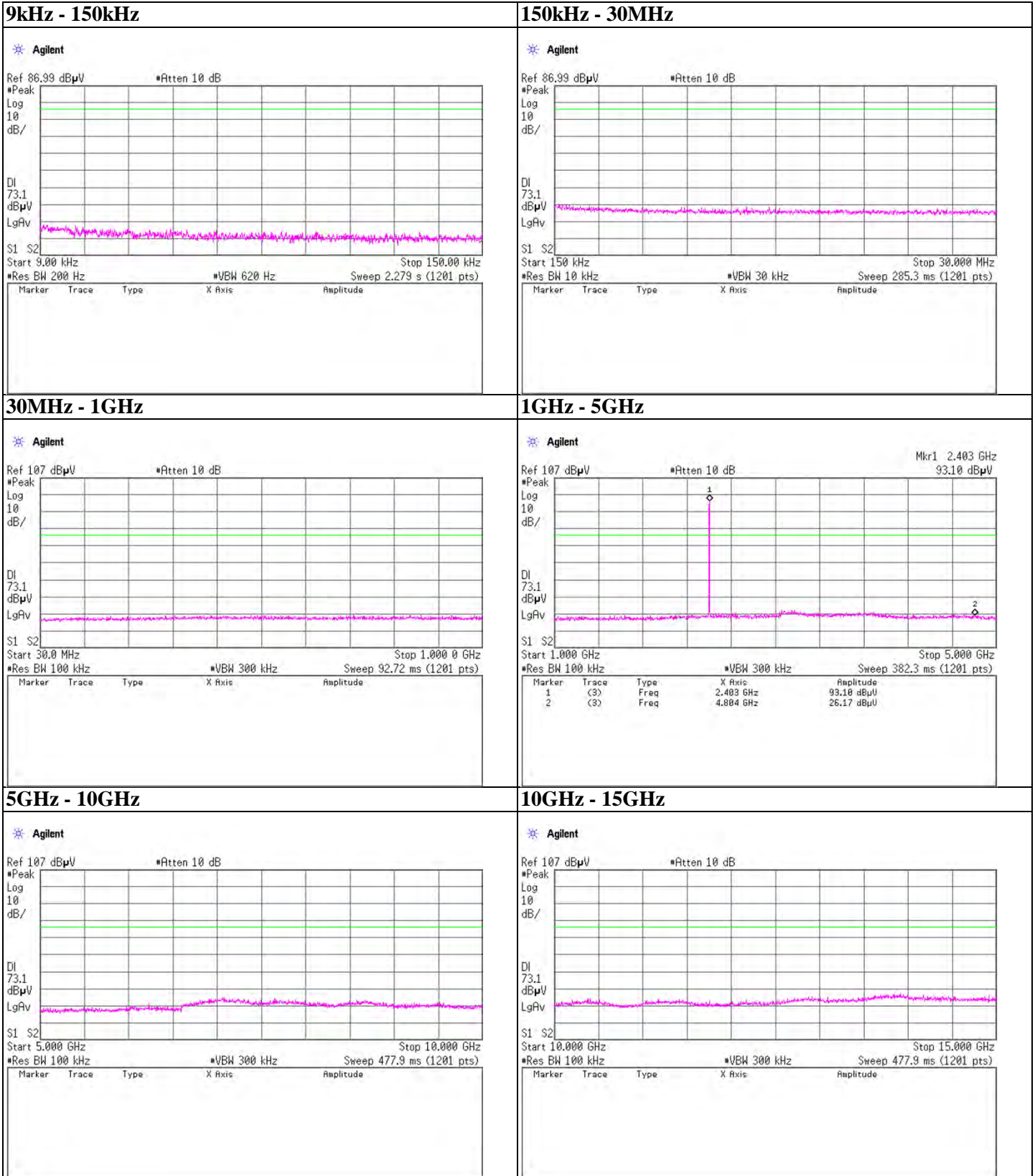
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Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Spurious emission (Conducted)

3-DH5,

Tx, 2402MHz



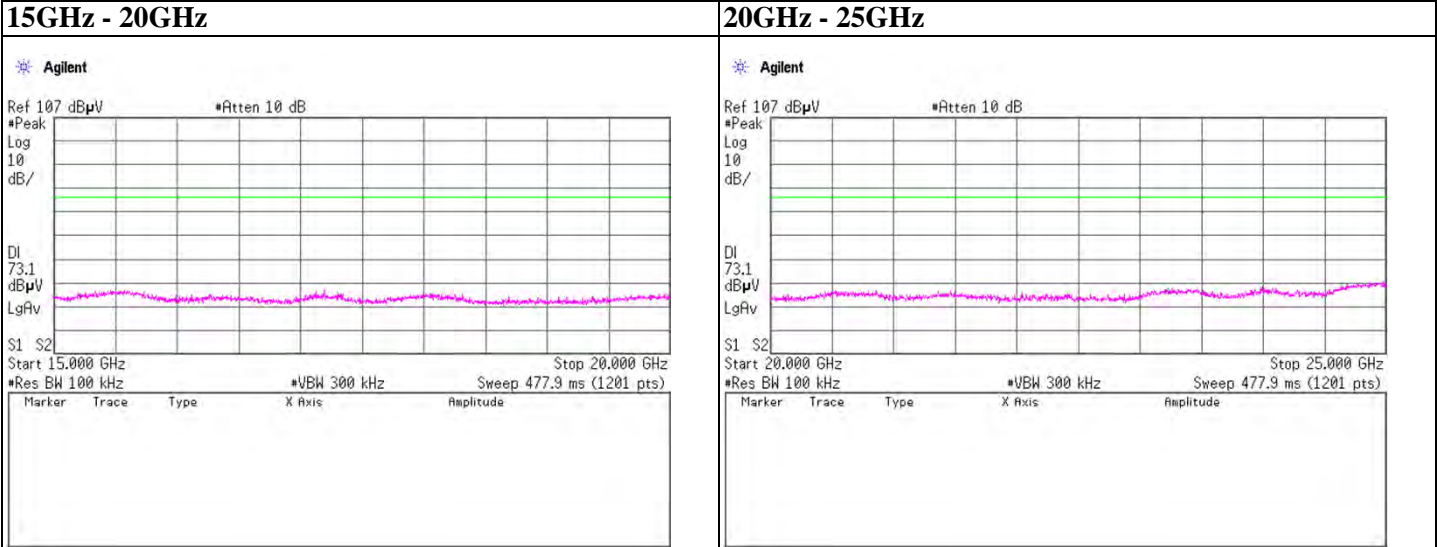
UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Spurious emission (Conducted)

3-DH5,

Tx, 2402MHz



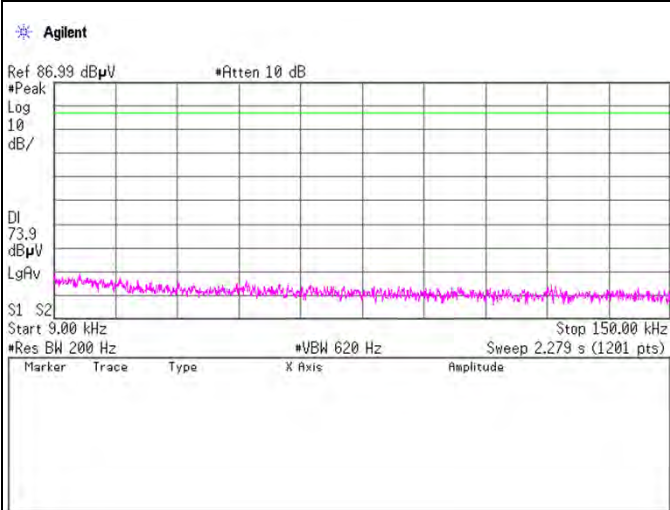
UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
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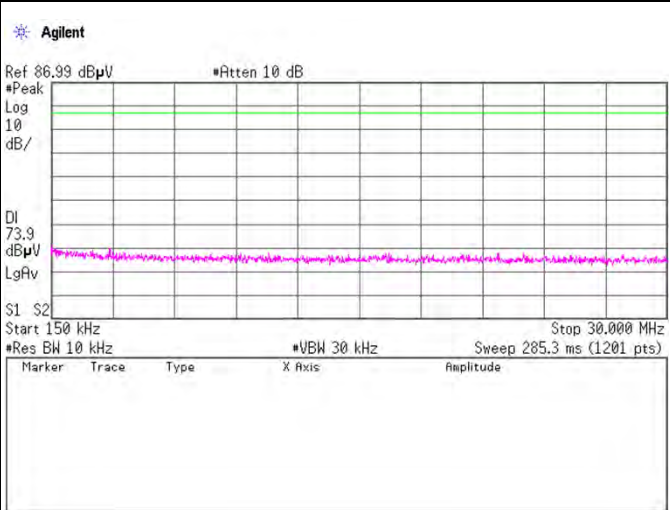
Spurious emission (Conducted)

3-DH5,
Tx, 2441MHz

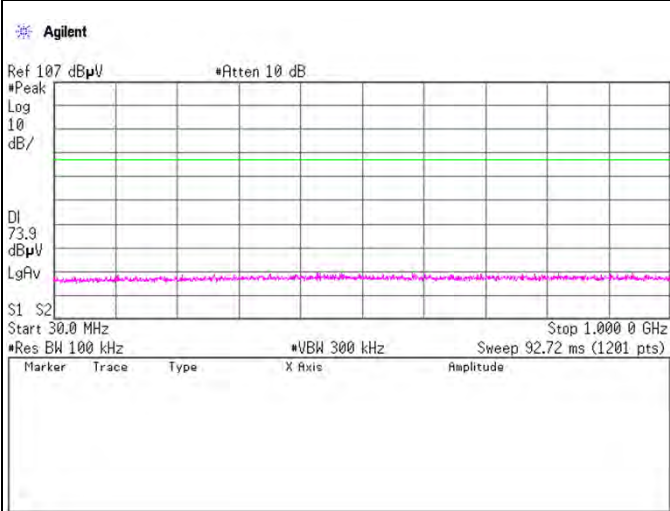
9kHz - 150kHz



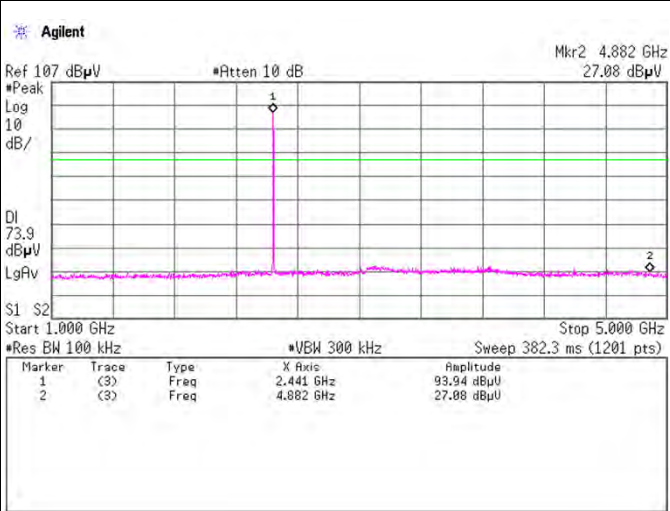
150kHz - 30MHz



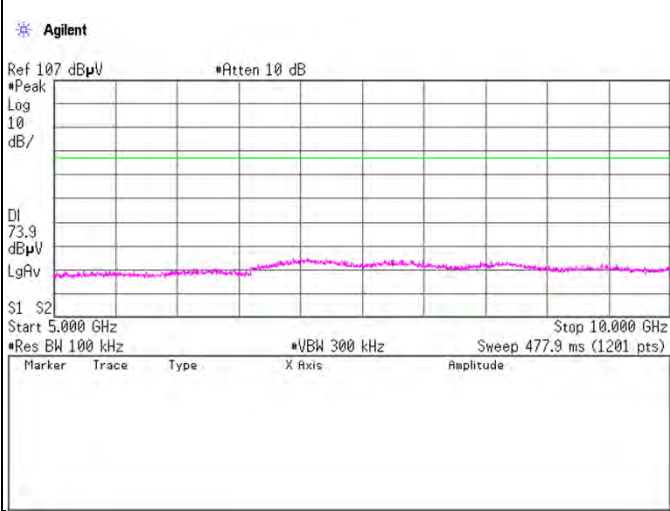
30MHz - 1GHz



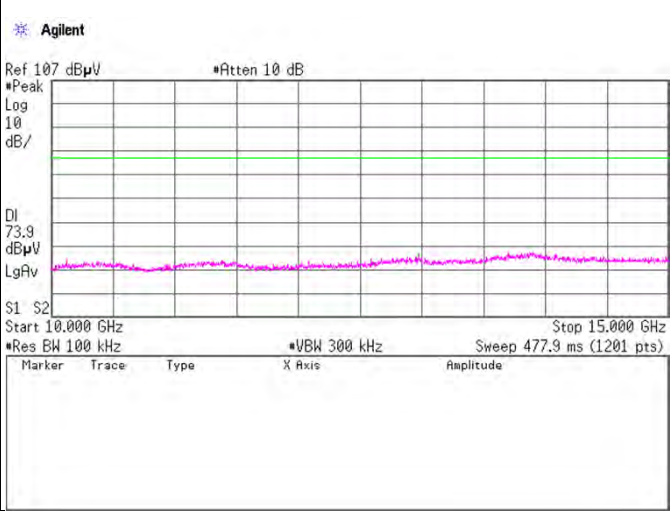
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz



UL Japan, Inc.
Shonan EMC Lab.

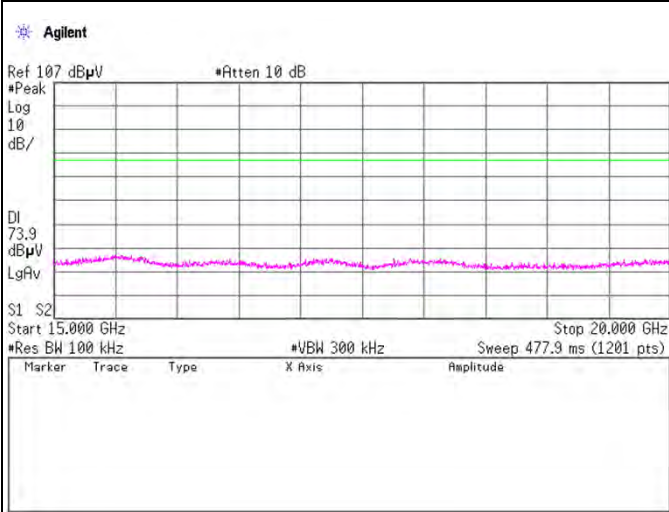
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Spurious emission (Conducted)

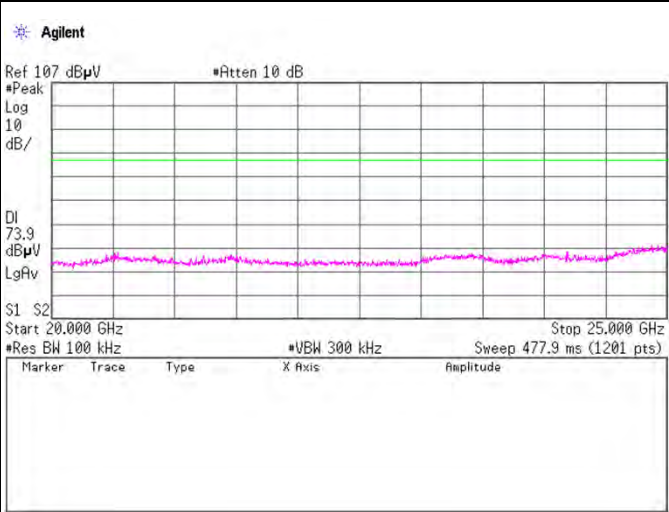
3-DH5,

Tx, 2441MHz

15GHz - 20GHz



20GHz - 25GHz



UL Japan, Inc.
Shonan EMC Lab.

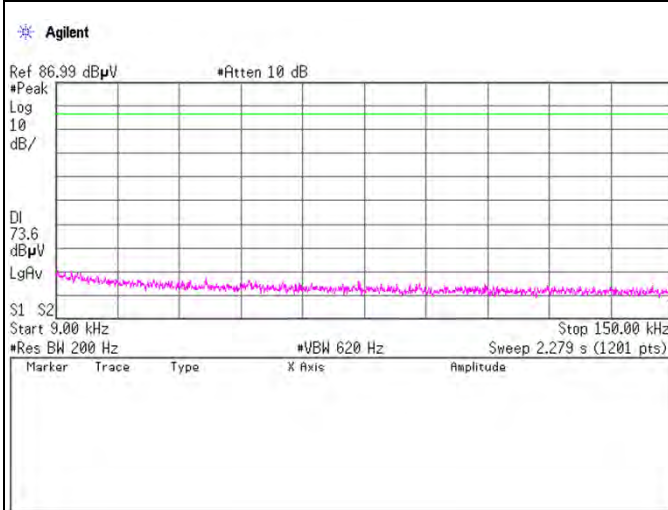
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Spurious emission (Conducted)

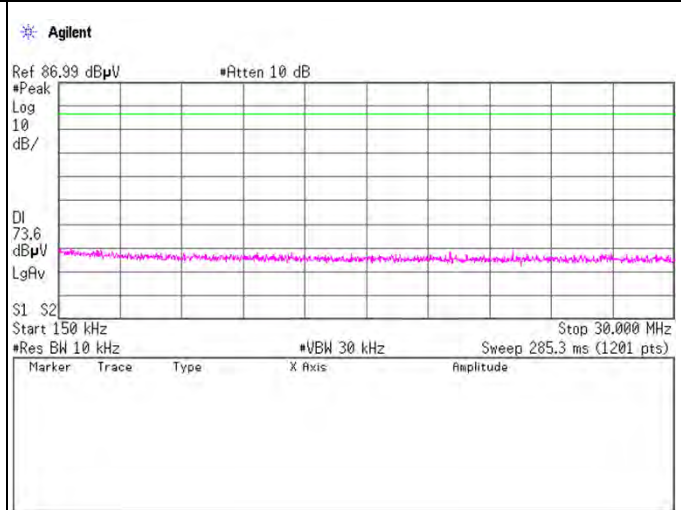
3-DH5,

Tx, 2480MHz

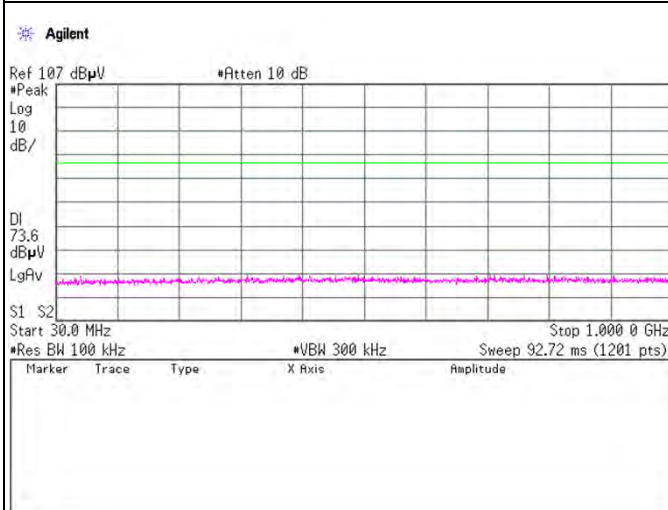
9kHz - 150kHz



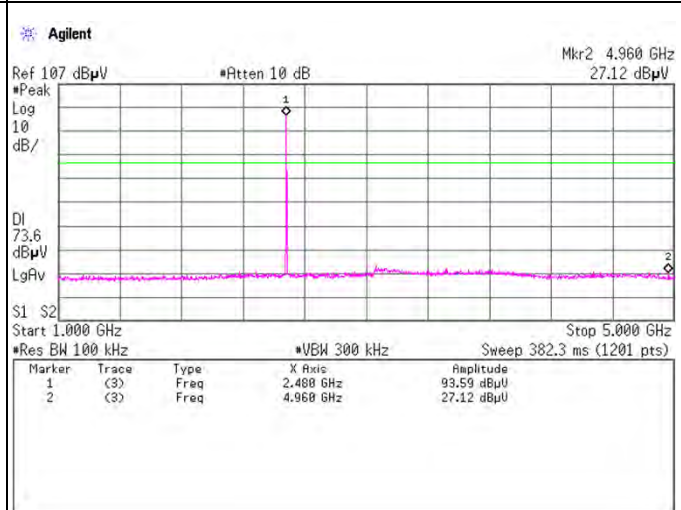
150kHz - 30MHz



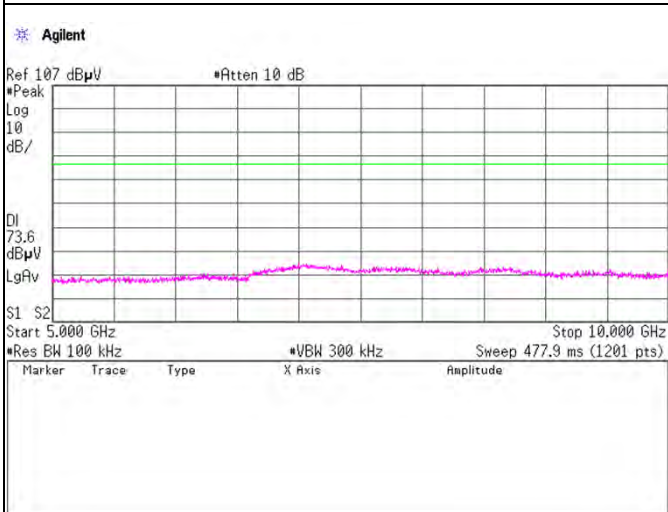
30MHz - 1GHz



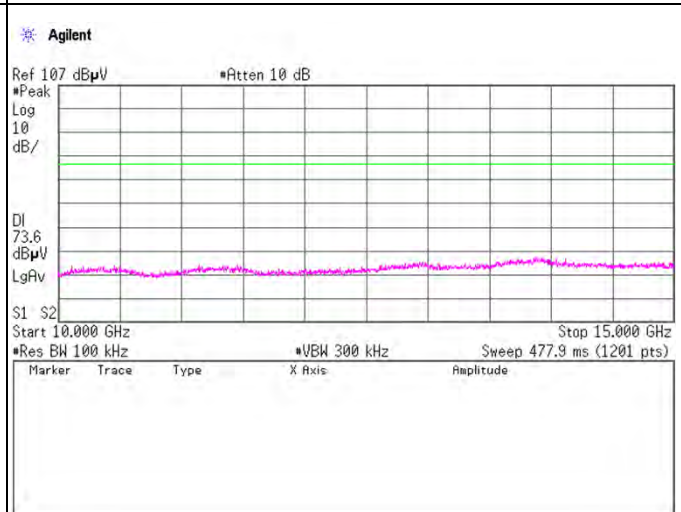
1GHz - 5GHz



5GHz - 10GHz



10GHz - 15GHz

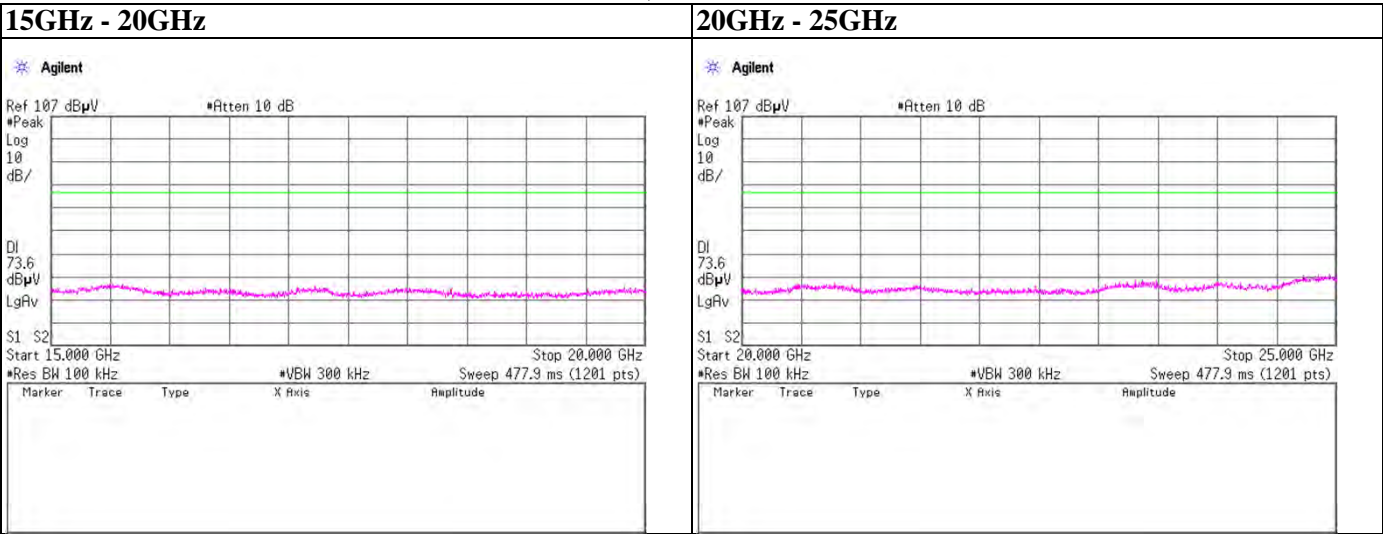


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Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Spurious emission (Conducted)

3-DH5,
Tx, 2480MHz



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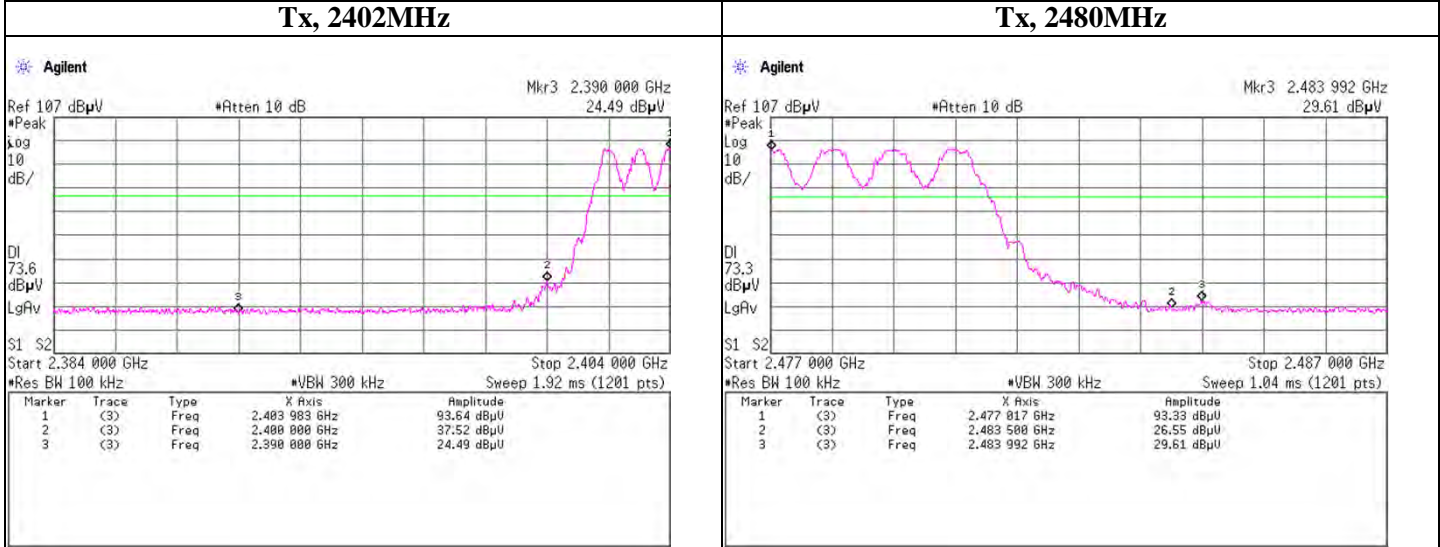
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Spurious emission (Conducted)

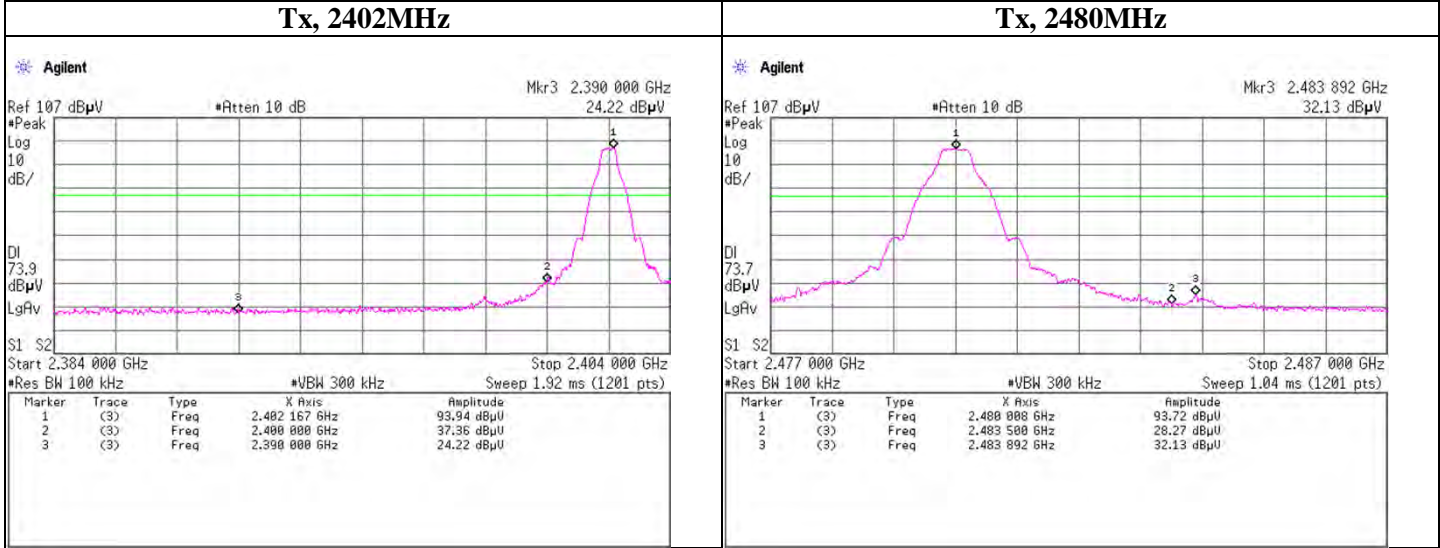
Band Edge compliance

DH5,

Hopping ON



Hopping OFF



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Spurious emission (Conducted)

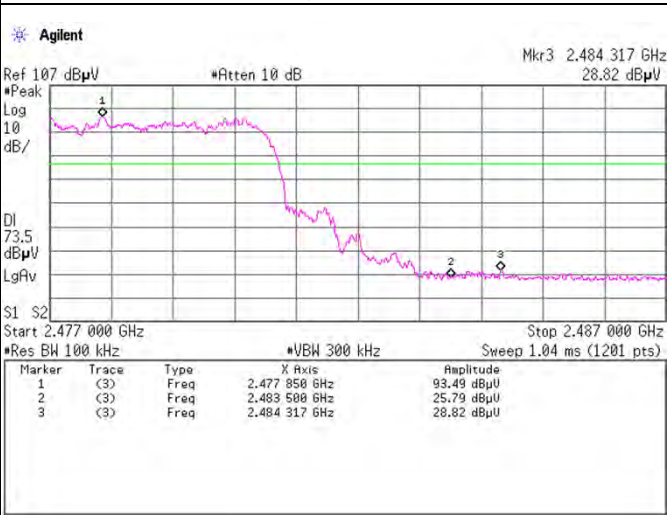
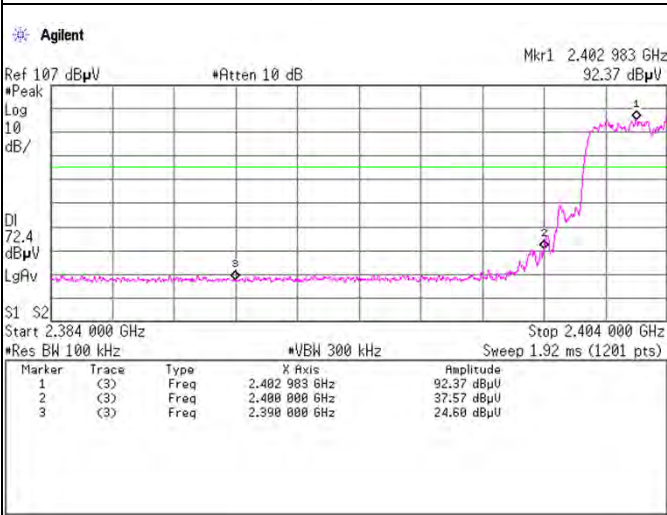
Band Edge compliance

3-DH5,

Hopping ON

Tx, 2402MHz

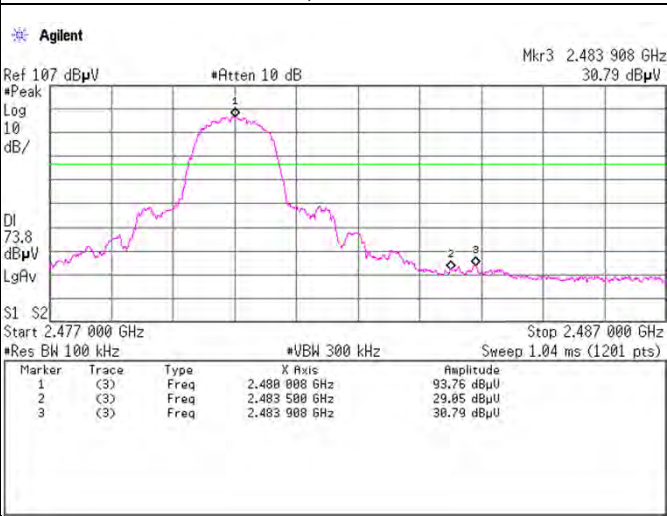
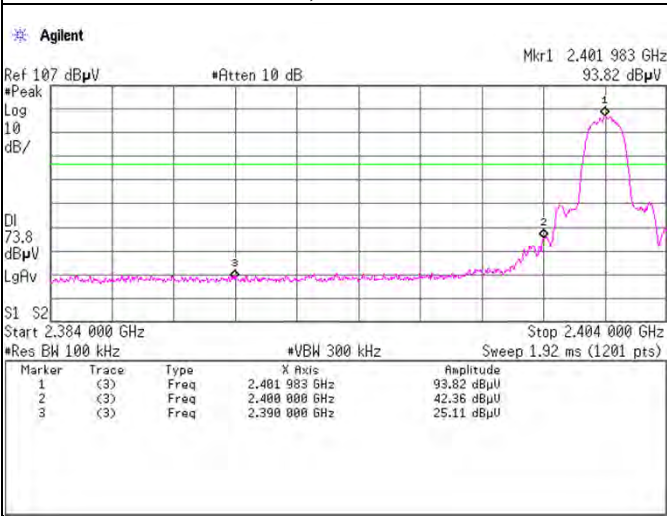
Tx, 2480MHz



Hopping OFF

Tx, 2402MHz

Tx, 2480MHz

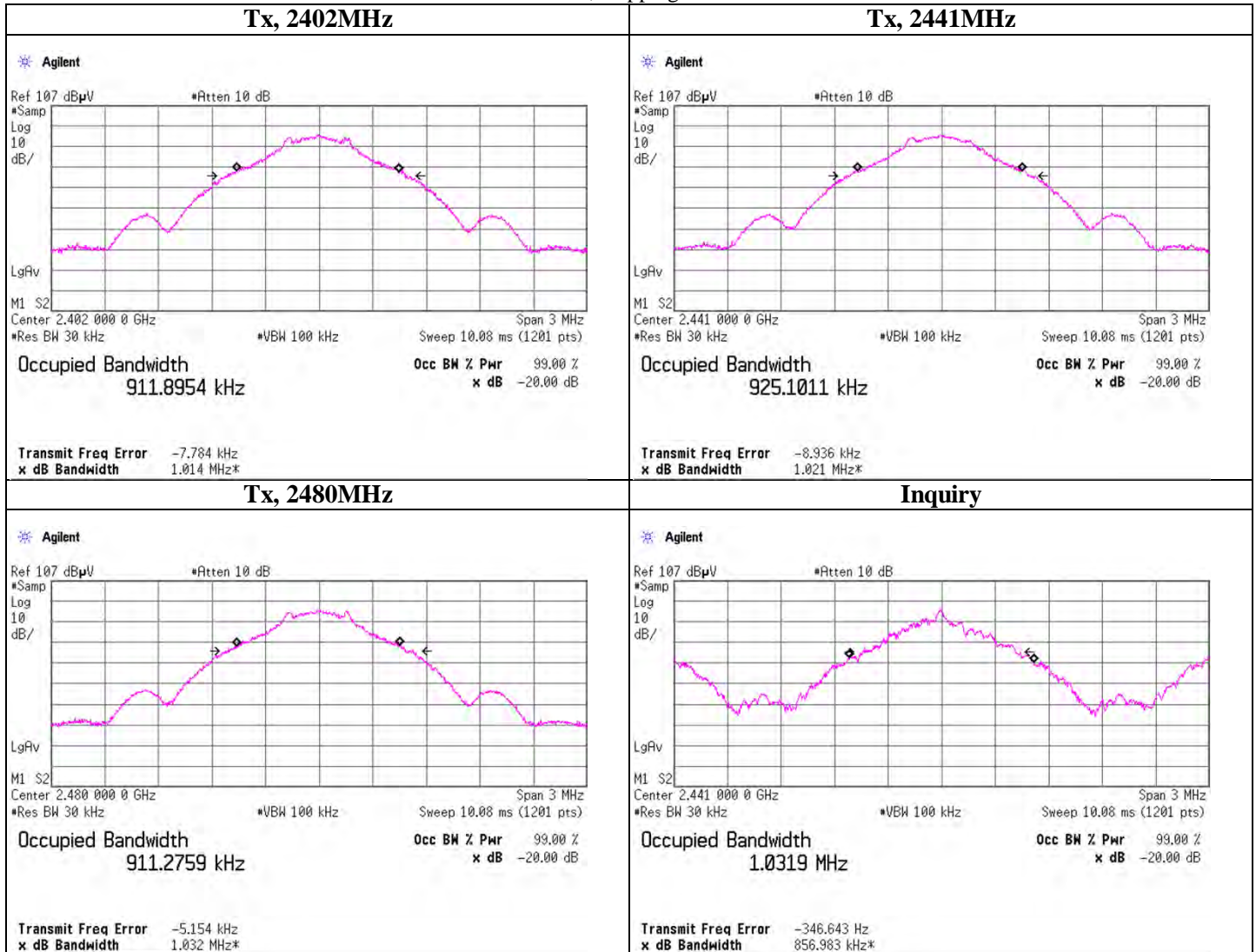


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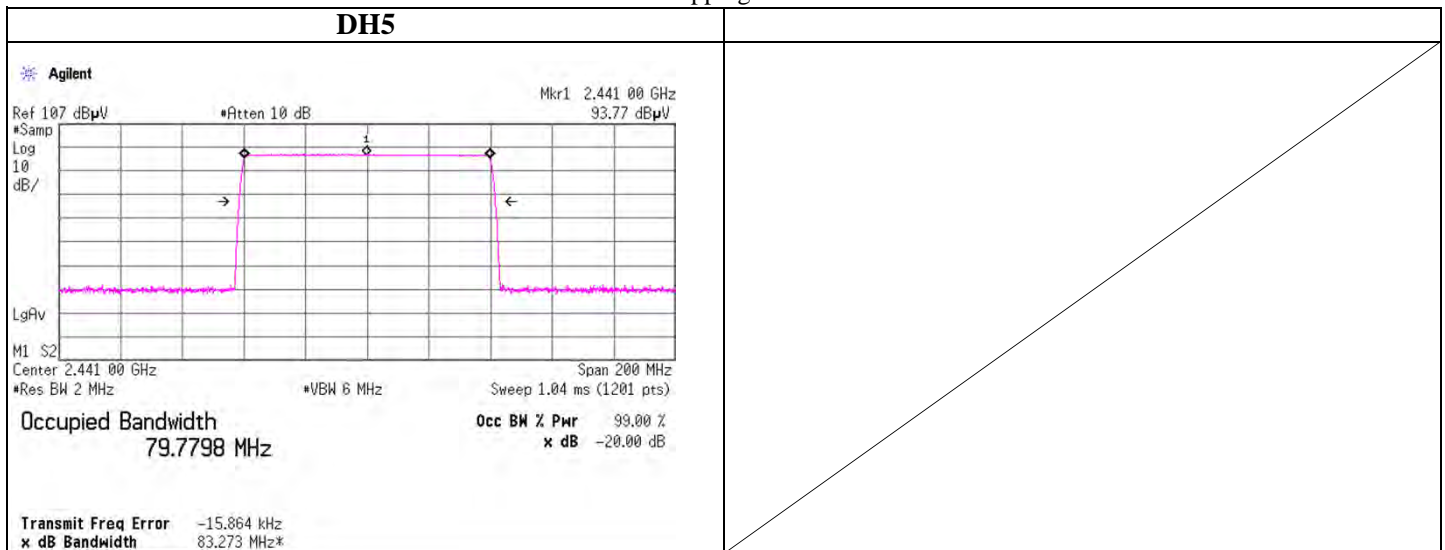
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

99% Occupied Bandwidth

DH5, Hopping Off



Hopping On

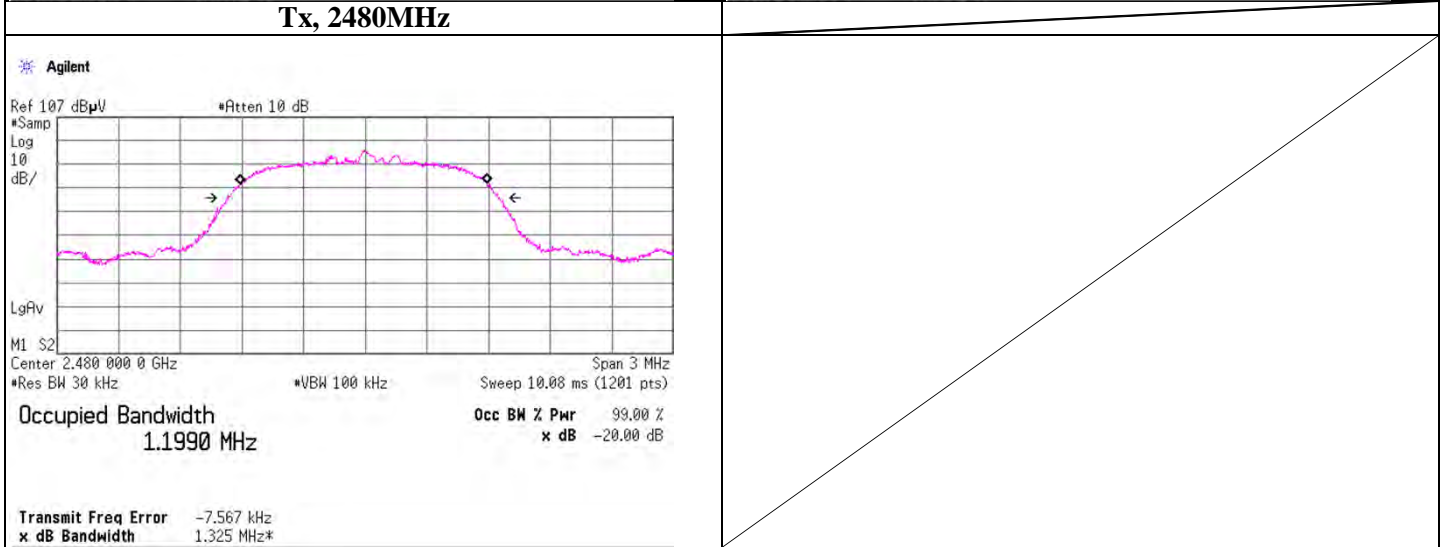
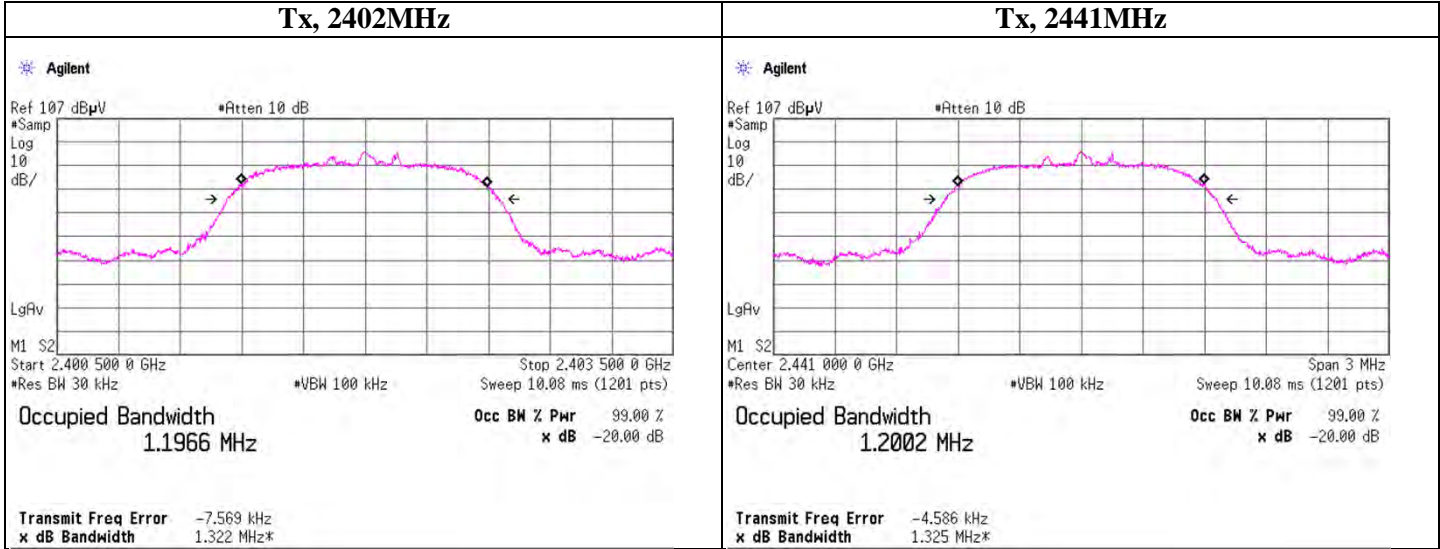


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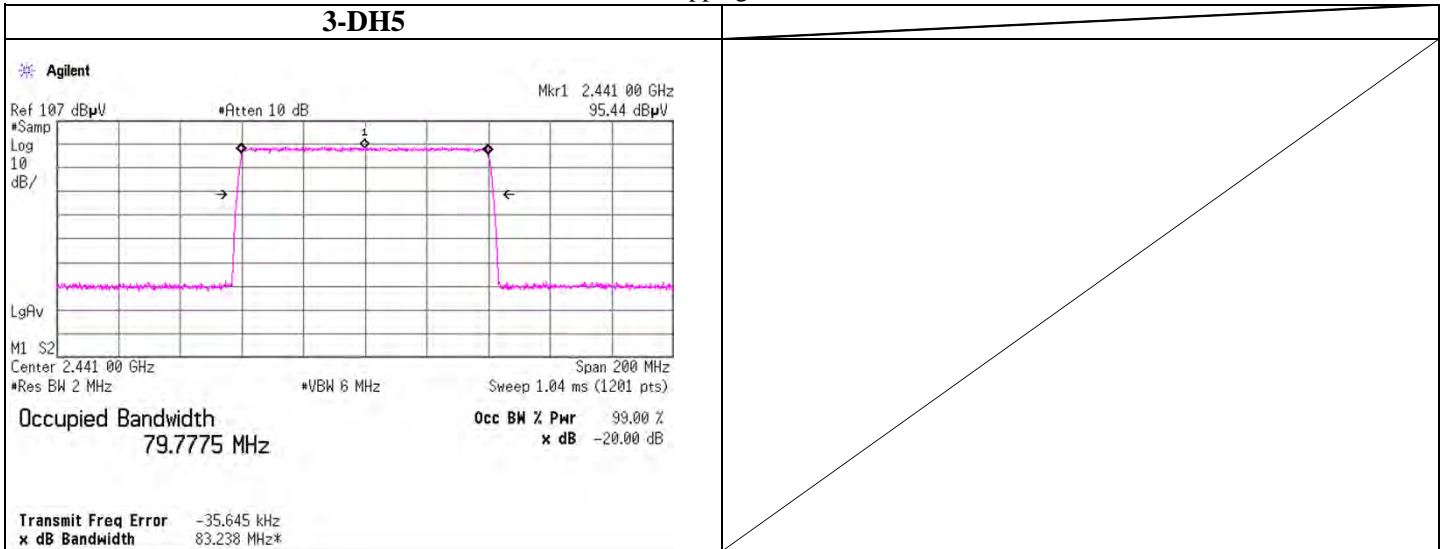
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Facsimile : +81 463 50 6401

99% Occupied Bandwidth

3-DH5, Hopping Off



Hopping On



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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)
KSA-08	Spectrum Analyzer	Agilent	E4446 A	MY46180525	AT	2011/02/02 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	AT	2011/03/23 * 12
SCC-G11	Coaxial Cable	Suhner	SUCOFLEX 102	31595/2	AT	2011/03/23 * 12
SCC-H1	Microwave cable	Hirose Electric	U_FL-2LP-066J1-A-(200)	-	AT	Pre Check
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2011/03/02 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2011/03/23 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104 A	46499/4 A	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-02	Spectrum Analyzer	Agilent	E4448 A	MY48250106	RE	2011/03/07 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,IMF)	-	RE	-
SAT10-04	Attenuator(above1GHz)	Agilent	8493C-010	74863	AT	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	HAP18-26 W	00000019	RE	2011/03/16 * 12
SCC-G17	Coaxial Cable	Suhner	SUCOFLEX 104 A	46291/4 A	RE	2011/03/16 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2011/02/23 * 12
SPM-06	Power Meter	Anritsu	ML2495 A	0850009	AT	2011/04/12 * 12
SPSS-03	Power sensor	Anritsu	MA2411 B	0917063	AT	2011/04/12 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2011/02/17 * 12
SAT6-01	Attenuator	JFW	50HF-006N	-	RE	2011/02/17 * 12
SAT3-04	Attenuator	JFW	50HF-003N	-	RE	2011/02/17 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2010/10/11 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269 (RF Selector)	RE	2011/04/28 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269 (RF Selector)	RE	2011/04/28 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108 A	UHALP 9108-A 0888	RE	2010/10/11 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2011/02/23 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2010/10/29 * 12
SJM-12	Measure	PROMART	SEN1935	-	RE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2010/09/11 * 12

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

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

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test Item :

RE: Radiated emission ,

AT: Antenna terminal conducted tests