

APPENDIX 2: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

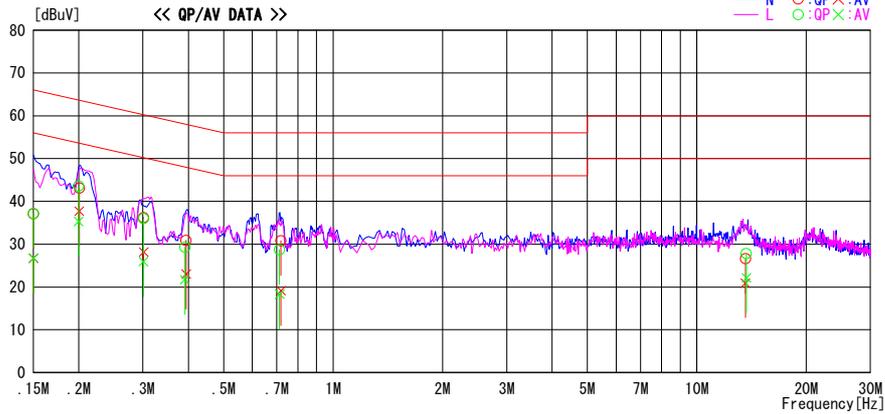
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2011/04/07

Report No. : 31HE0013-H0-01

Temp./Humi. : 22deg. C. / 3RH
Engineer : Kazuya Yoshioka

Mode / Remarks 11b Tx mode 2412MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

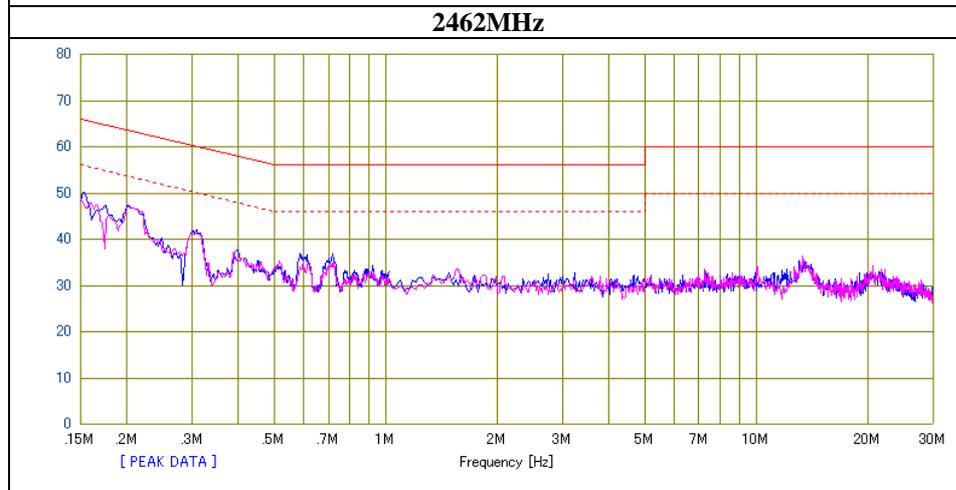
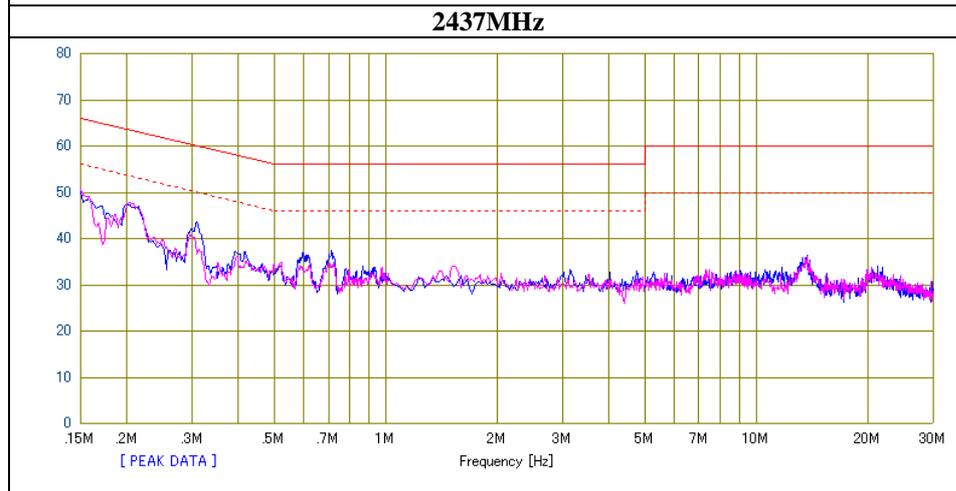
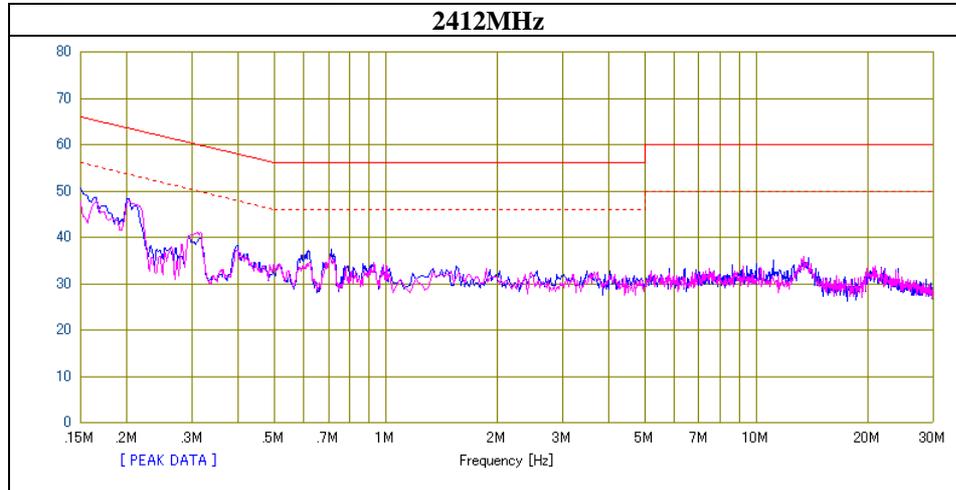


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	24.0	13.6	13.1	37.1	26.7	66.0	56.0	28.9	29.3	N	
0.20050	29.8	24.4	13.3	43.1	37.7	63.6	53.6	20.5	15.9	N	
0.30150	22.9	14.9	13.3	36.2	28.2	60.2	50.2	24.0	22.0	N	
0.39458	17.6	9.7	13.3	30.9	23.0	58.0	48.0	27.1	25.0	N	
0.71852	17.5	5.8	13.3	30.8	19.1	56.0	46.0	25.2	26.9	N	
13.59676	12.3	6.6	14.3	26.6	20.9	60.0	50.0	33.4	29.1	N	
0.15000	24.1	13.6	13.1	37.2	26.7	66.0	56.0	28.8	29.3	L	
0.19970	30.5	22.2	13.1	43.6	35.3	63.6	53.6	20.0	18.3	L	
0.30090	22.7	12.6	13.3	36.0	25.9	60.2	50.2	24.2	24.3	L	
0.39138	16.0	8.4	13.3	29.3	21.7	58.0	48.0	28.7	26.3	L	
0.71277	15.4	5.0	13.3	28.7	18.3	56.0	46.0	27.3	27.7	L	
13.67663	13.5	7.8	14.3	27.8	22.1	60.0	50.0	32.2	27.9	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F.(LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	31HE0013-HO-01
Date	04/07/2011
Temperature/ Humidity	22 deg.C / 32% RH
Engineer	Kazuya Yoshioka
Mode	11b Tx



Y scale [dBuV]

Chart - N - L

Conducted Emission

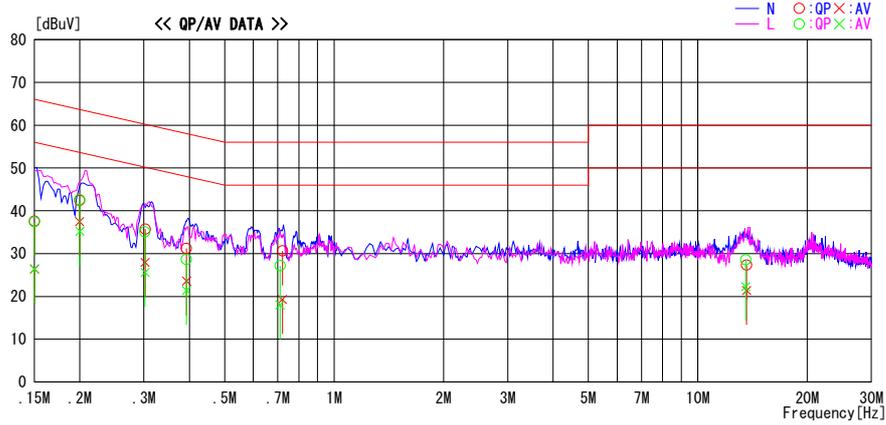
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2011/04/07

Report No. : 31HE0013-H0-01
 Temp./Humi. : 22deg. / 3RH
 Engineer : Kazuya Yoshioka

Mode / Remarks 11g Tx mode 2412MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

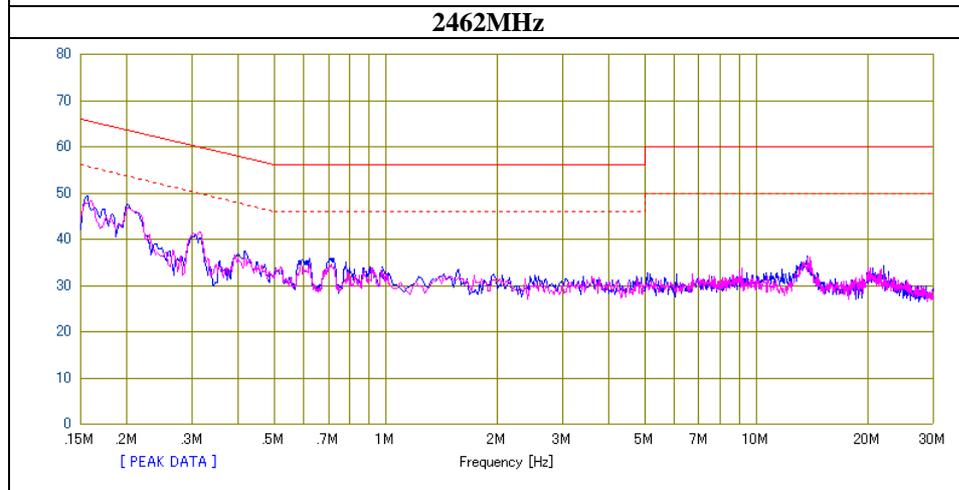
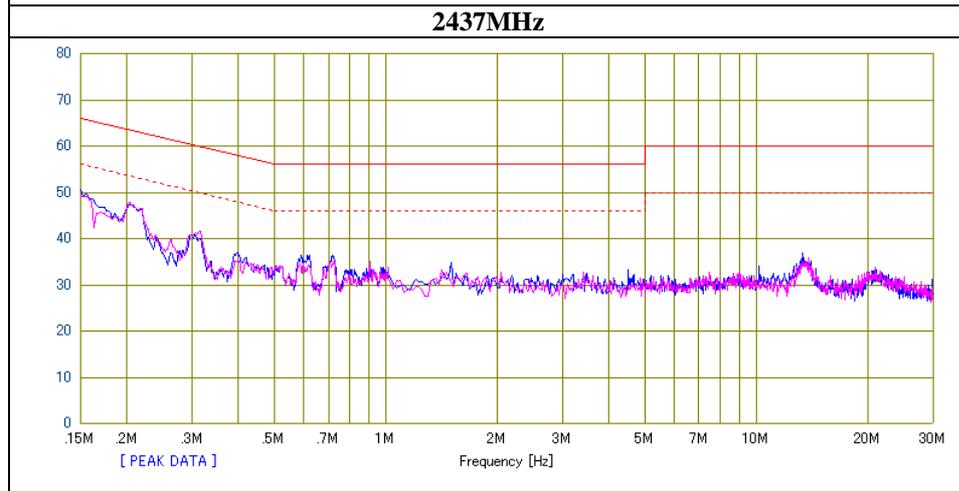
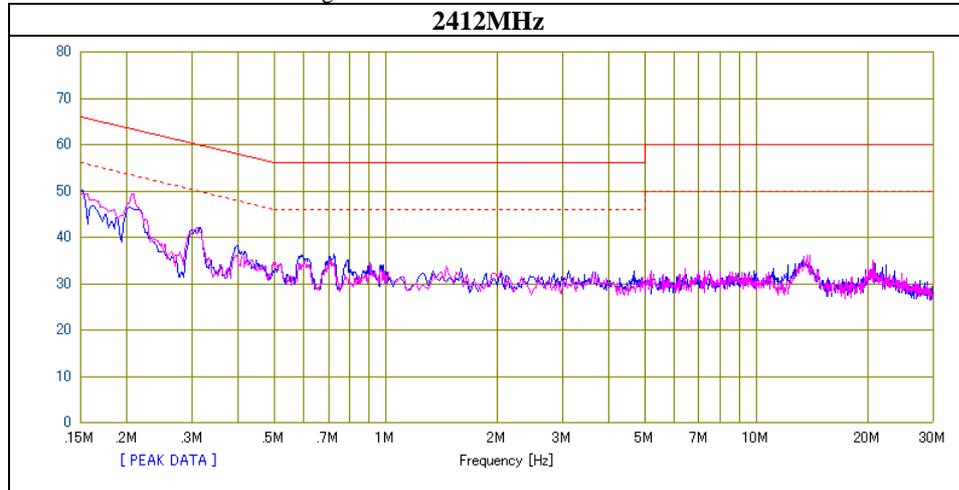


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	24.5	13.3	13.1	37.6	26.4	66.0	56.0	28.4	29.6	N	
0.19965	29.3	24.4	13.1	42.4	37.5	63.6	53.6	21.2	16.1	N	
0.30230	22.4	14.6	13.3	35.7	27.9	60.2	50.2	24.5	22.3	N	
0.39258	17.9	10.3	13.3	31.2	23.6	58.0	48.0	26.8	24.4	N	
0.72130	17.3	6.0	13.3	30.6	19.3	56.0	46.0	25.4	26.7	N	
13.62301	13.0	7.1	14.3	27.3	21.4	60.0	50.0	32.7	28.6	N	
0.15000	24.3	13.3	13.1	37.4	26.4	66.0	56.0	28.6	29.6	L	
0.19995	29.5	22.1	13.1	42.6	35.2	63.6	53.6	21.0	18.4	L	
0.30185	21.8	12.3	13.3	35.1	25.6	60.2	50.2	25.1	24.6	L	
0.39270	15.3	8.1	13.3	28.6	21.4	58.0	48.0	29.4	26.6	L	
0.71017	13.9	4.7	13.3	27.2	18.0	56.0	46.0	28.8	28.0	L	
13.54213	14.3	8.1	14.2	28.5	22.3	60.0	50.0	31.5	27.7	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F(LIN LOSS+CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

Conducted Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	31HE0013-HO-01
Date	04/07/2011
Temperature/ Humidity	22 deg.C / 32% RH
Engineer	Kazuya Yoshioka
Mode	11g Tx



Y scale [dBuV]

Chart - N - L

Conducted Emission

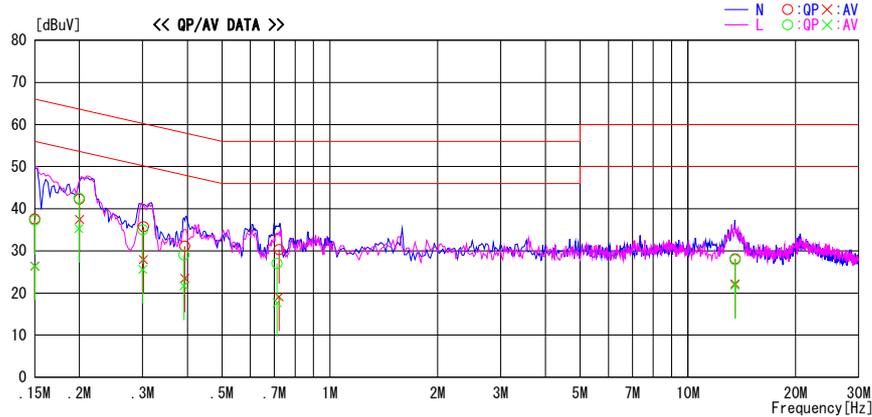
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2011/04/07

Report No. : 31HE0013-HO-01
 Temp./Humi. : 22deg. C. / 3RH
 Engineer : Kazuya Yoshioka

Mode / Remarks 11n-20 Tx mode 2412MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

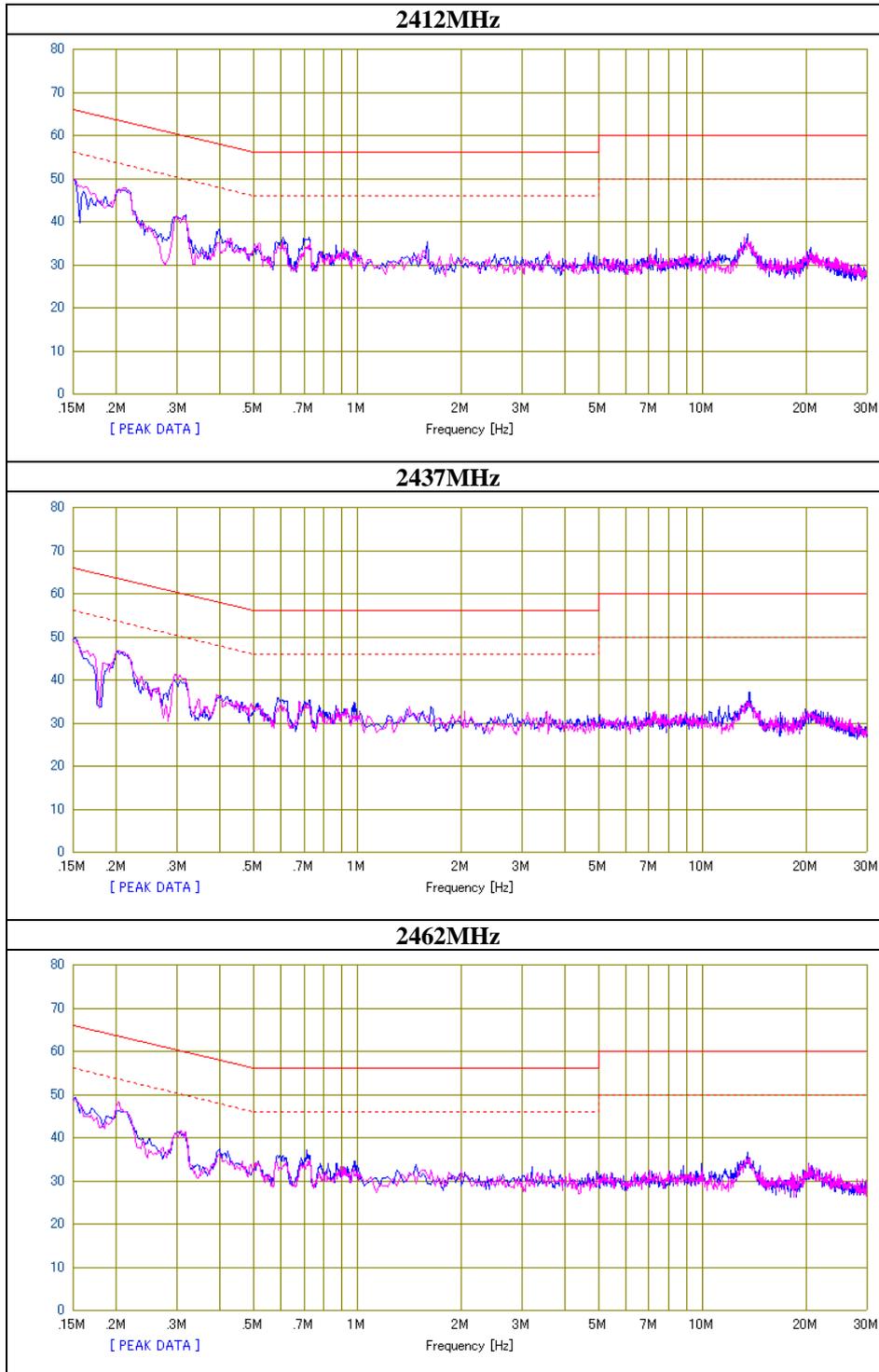


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	24.5	13.3	13.1	37.6	26.4	66.0	56.0	28.4	29.6	N	
0.19983	29.2	24.4	13.1	42.3	37.5	63.6	53.6	21.3	16.1	N	
0.30168	22.4	14.6	13.3	35.7	27.9	60.2	50.2	24.5	22.3	N	
0.39363	17.8	10.2	13.3	31.1	23.5	58.0	48.0	26.9	24.5	N	
0.72120	17.0	5.8	13.3	30.3	19.1	56.0	46.0	25.7	26.9	N	
13.54488	13.9	8.0	14.2	28.1	22.2	60.0	50.0	31.9	27.8	N	
0.15000	24.2	13.3	13.1	37.3	26.4	66.0	56.0	28.7	29.6	L	
0.19928	29.4	22.2	13.1	42.5	35.3	63.6	53.6	21.1	18.3	L	
0.30028	21.7	12.3	13.3	35.0	25.6	60.2	50.2	25.2	24.6	L	
0.39123	15.7	8.4	13.3	29.0	21.7	58.0	48.0	29.0	26.3	L	
0.71255	13.7	4.4	13.3	27.0	17.7	56.0	46.0	29.0	28.3	L	
13.54901	13.7	7.7	14.2	27.9	21.9	60.0	50.0	32.1	28.1	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (LISN LOSS+CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

Conducted Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 31HE0013-HO-01
Date : 04/07/2011
Temperature/ Humidity : 22 deg.C / 32% RH
Engineer : Kazuya Yoshioka
Mode : 1In Tx



6dB Bandwidth

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 31HE0013-HO-01
Date 02/16/2011
Temperature/ Humidity 21 deg.C / 31% RH
Engineer Keisuke Kawamura
Mode Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	10.130	>500
2437	9.782	>500
2462	9.779	>500

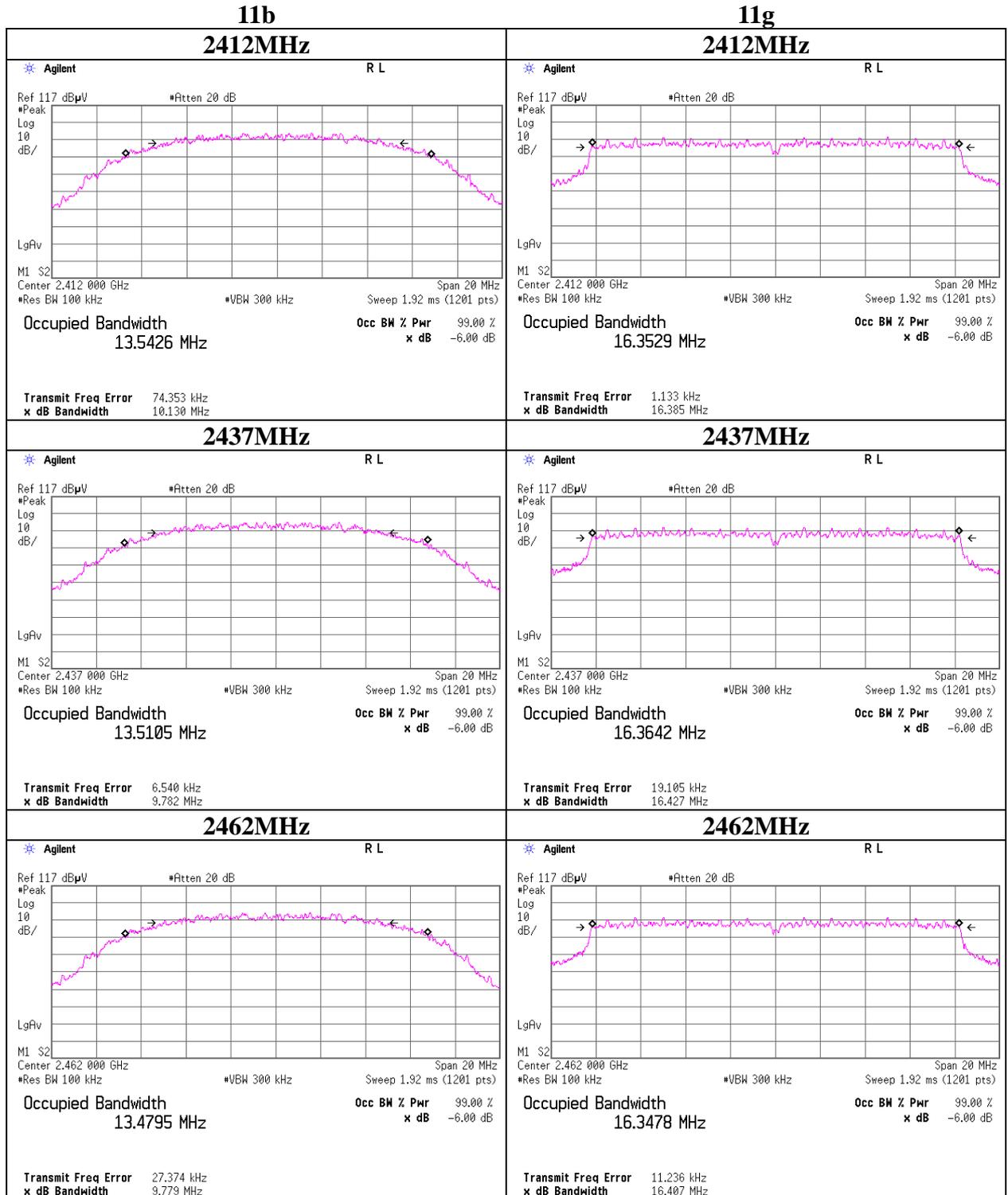
11g

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	16.385	>500
2437	16.427	>500
2462	16.407	>500

11n-20

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	17.625	>500
2437	17.243	>500
2462	17.518	>500

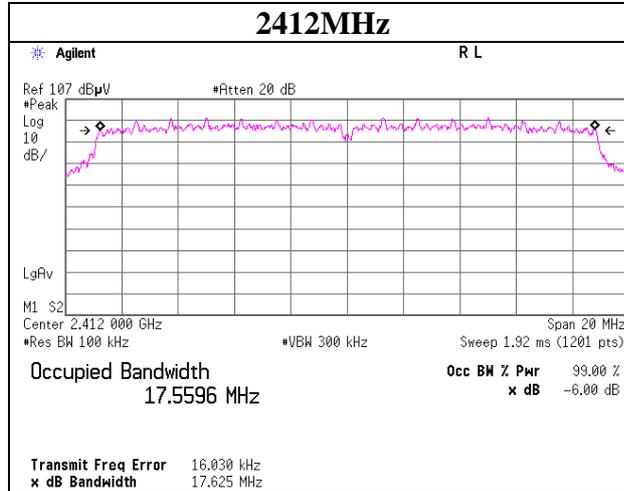
6dB Bandwidth



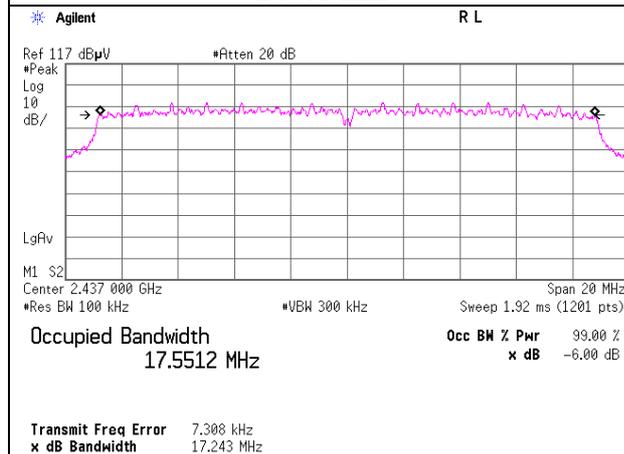
6dB Bandwidth

11n-20

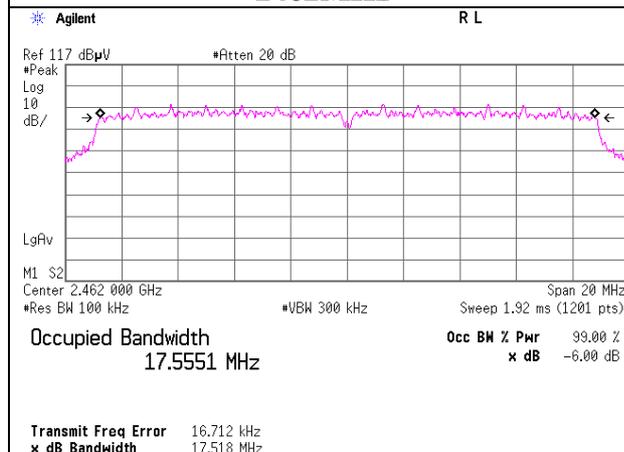
2412MHz



2437MHz



2462MHz



Maximum Peak Output Power

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 31HE0013-HO-01
Date 03/25/2011
Temperature/ Humidity 20 deg.C / 40% RH
Engineer Katsunori Okai
Mode 11b Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	6.12	0.97	10.07	17.16	52.00	30.00	1000	12.84
2437	6.27	0.97	10.07	17.31	53.83	30.00	1000	12.69
2462	5.98	0.97	10.07	17.02	50.35	30.00	1000	12.98

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

2437MHz

Rate [Mbps]	Reading [dBm]	Remark
1	6.25	
2	6.24	
5.5	6.27	*
11	6.26	

*: Worst Rate

All comparizon were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place Head Office EMC Lab. No.11 Measurement Room
Report No. 31HE0013-HO-01
Date 03/25/2011
Temperature/ Humidity 20 deg.C / 40% RH
Engineer Katsunori Okai
Mode 11g Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	10.91	0.97	10.07	21.95	156.68	30.00	1000	8.05
2437	10.63	0.97	10.07	21.67	146.89	30.00	1000	8.33
2462	10.60	0.97	10.07	21.64	145.88	30.00	1000	8.36

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

2437MHz

Rate [Mbps]	Reading [dBm]	Remark
6	10.02	
9	9.76	
12	10.20	
18	9.68	
24	10.63	*
36	10.27	
48	10.27	
54	8.95	

*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	31HE0013-HO-01
Date	03/25/2011
Temperature/ Humidity	20 deg.C / 40% RH
Engineer	Katsunori Okai
Mode	11n-20 Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	10.29	0.97	10.07	21.33	135.83	30.00	1000	8.67
2437	9.98	0.97	10.07	21.02	126.47	30.00	1000	8.98
2462	10.07	0.97	10.07	21.11	129.12	30.00	1000	8.89

Sample Calculation:
 Result = Reading + Cable Loss + Attenuator

2437MHz

MCS Number	Reading [dBm]	Remark
0	9.81	
1	9.82	
2	9.94	
3	9.91	
4	9.98	*
5	9.62	
6	9.43	
7	7.10	

*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 31HE0013-HO-01
Date 04/05/2011 04/06/2011
Temperature/ Humidity 25 deg.C / 33% RH 22 deg.C / 32% RH
Engineer Kazuya Yoshioka Takeshi Choda
(1-10GHz) (Above 10GHz and below 1GHz)
Mode 11b Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	42.953	QP	30.2	14.9	7.3	32.2	20.2	40.0	19.8	
Hori	47.997	QP	43.6	12.4	7.4	32.2	31.2	40.0	8.8	
Hori	75.567	QP	52.5	6.5	7.8	32.1	34.7	40.0	5.3	
Hori	196.604	QP	41.9	16.6	9.1	32.0	35.6	43.5	7.9	
Hori	479.975	QP	42.0	18.0	11.1	32.0	39.1	46.0	6.9	
Hori	658.624	QP	34.5	20.0	12.1	31.9	34.7	46.0	11.3	
Hori	2483.500	PK	47.3	27.6	2.4	32.6	44.7	73.9	29.2	
Hori	4924.000	PK	42.7	32.0	4.9	31.9	47.7	73.9	26.2	
Hori	7386.000	PK	41.5	36.2	6.1	32.4	51.4	73.9	22.5	NS
Hori	9848.000	PK	41.1	38.1	6.7	32.9	53.0	73.9	20.9	NS
Hori	24620.000	PK	47.4	38.0	-1.2	31.3	52.9	73.9	21.0	NS
Hori	2483.500	AV	34.7	27.6	2.4	32.6	32.1	53.9	21.8	
Hori	4924.000	AV	29.9	32.0	4.9	31.9	34.9	53.9	19.0	
Hori	7386.000	AV	29.8	36.2	6.1	32.4	39.7	53.9	14.2	NS
Hori	9848.000	AV	29.6	38.1	6.7	32.9	41.5	53.9	12.4	NS
Hori	24620.000	AV	34.8	38.0	-1.2	31.3	40.3	53.9	13.6	NS
Vert	42.953	QP	40.7	14.9	7.3	32.2	30.7	40.0	9.3	
Vert	47.997	QP	42.7	12.4	7.4	32.2	30.3	40.0	9.7	
Vert	75.567	QP	48.7	6.5	7.8	32.1	30.9	40.0	9.1	
Vert	196.604	QP	38.9	16.6	9.1	32.0	32.6	43.5	10.9	
Vert	479.976	QP	36.9	18.0	11.1	32.0	34.0	46.0	12.0	
Vert	658.624	QP	31.1	20.0	12.1	31.9	31.3	46.0	14.7	
Vert	2483.500	PK	46.4	27.6	2.4	32.6	43.8	73.9	30.1	
Vert	4924.000	PK	49.5	32.0	4.9	31.9	54.5	73.9	19.4	
Vert	7386.000	PK	41.4	36.2	6.1	32.4	51.3	73.9	22.6	NS
Vert	9848.000	PK	40.9	38.1	6.7	32.9	52.8	73.9	21.1	NS
Vert	24620.000	PK	47.7	38.0	-1.2	31.3	53.2	73.9	20.7	NS
Vert	2483.500	AV	33.5	27.6	2.4	32.6	30.9	53.9	23.0	
Vert	4924.000	AV	32.8	32.0	4.9	31.9	37.8	53.9	16.1	
Vert	7386.000	AV	29.8	36.2	6.1	32.4	39.7	53.9	14.2	NS
Vert	9848.000	AV	29.6	38.1	6.7	32.9	41.5	53.9	12.4	NS
Vert	24620.000	AV	34.8	38.0	-1.2	31.3	40.3	53.9	13.6	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

NS:No Signal Detect

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 31HE0013-HO-01
Date : 04/05/2011 04/06/2011 04/06/2011
Temperature/ Humidity : 25 deg.C / 33% RH 22 deg.C / 32% RH 22 deg.C / 32% RH
Engineer : Kazuya Yoshioka Takeshi Choda Kazuya Yoshioka
(1-10GHz) (Above 10GHz) (Below 1GHz)
Mode : 11g Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	42.953	QP	30.2	14.9	7.3	32.2	20.2	40.0	19.8	
Hori	47.997	QP	43.4	12.4	7.4	32.2	31.0	40.0	9.0	
Hori	75.567	QP	52.4	6.5	7.8	32.1	34.6	40.0	5.4	
Hori	196.604	QP	42.0	16.6	9.1	32.0	35.7	43.5	7.8	
Hori	479.975	QP	41.1	18.0	11.1	32.0	38.2	46.0	7.8	
Hori	658.624	QP	34.3	20.0	12.1	31.9	34.5	46.0	11.5	
Hori	2390.000	PK	61.8	27.7	2.3	32.6	59.2	73.9	14.7	
Hori	2400.000	PK	77.8	27.7	2.4	32.6	75.3	-	-	See 20dBc Data Sheet
Hori	4824.000	PK	40.7	31.7	4.9	31.9	45.4	73.9	28.5	NS
Hori	7236.000	PK	41.2	36.2	6.0	32.4	51.0	73.9	22.9	NS
Hori	9648.000	PK	41.4	38.0	6.7	32.9	53.2	73.9	20.7	NS
Hori	24120.000	PK	47.9	37.8	-1.4	31.6	52.7	73.9	21.2	NS
Hori	2390.000	AV	46.6	27.7	2.3	32.6	44.0	53.9	9.9	
Hori	2400.000	AV	60.8	27.7	2.4	32.6	58.3	-	-	See 20dBc Data Sheet
Hori	4824.000	AV	28.7	31.7	4.9	31.9	33.4	53.9	20.5	NS
Hori	7236.000	AV	29.5	36.2	6.0	32.4	39.3	53.9	14.6	NS
Hori	9648.000	AV	29.6	38.0	6.7	32.9	41.4	53.9	12.5	NS
Hori	24120.000	AV	34.8	37.8	-1.4	31.6	39.6	53.9	14.3	NS
Vert	42.953	QP	40.7	14.9	7.3	32.2	30.7	40.0	9.3	
Vert	47.997	QP	42.8	12.4	7.4	32.2	30.4	40.0	9.6	
Vert	75.567	QP	48.8	6.5	7.8	32.1	31.0	40.0	9.0	
Vert	196.604	QP	38.8	16.6	9.1	32.0	32.5	43.5	11.0	
Vert	479.976	QP	36.7	18.0	11.1	32.0	33.8	46.0	12.2	
Vert	658.624	QP	31.3	20.0	12.1	31.9	31.5	46.0	14.5	
Vert	2390.000	PK	62.1	27.7	2.3	32.6	59.5	73.9	14.4	
Vert	2400.000	PK	77.7	27.7	2.4	32.6	75.2	-	-	See 20dBc Data Sheet
Vert	4824.000	PK	40.5	31.7	4.9	31.9	45.2	73.9	28.7	NS
Vert	7236.000	PK	41.1	36.2	6.0	32.4	50.9	73.9	23.0	NS
Vert	9648.000	PK	41.6	38.0	6.7	32.9	53.4	73.9	20.5	NS
Vert	24120.000	PK	47.4	37.8	-1.4	31.6	52.2	73.9	21.7	NS
Vert	2390.000	AV	46.9	27.7	2.3	32.6	44.3	53.9	9.6	
Vert	2400.000	AV	60.8	27.7	2.4	32.6	58.3	-	-	See 20dBc Data Sheet
Vert	4824.000	AV	28.7	31.7	4.9	31.9	33.4	53.9	20.5	NS
Vert	7236.000	AV	29.5	36.2	6.0	32.4	39.3	53.9	14.6	NS
Vert	9648.000	AV	29.6	38.0	6.7	32.9	41.4	53.9	12.5	NS
Vert	24120.000	AV	34.8	37.8	-1.4	31.6	39.6	53.9	14.3	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

NS:No Signal Detect

20dBc Data Sheet

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	97.1	27.7	2.4	32.6	94.6	-	-	Carrier
Hori	2400.000	PK	64.0	27.7	2.4	32.6	61.5	74.6	13.1	
Vert	2412.000	PK	96.0	27.7	2.4	32.6	93.5	-	-	Carrier
Vert	2400.000	PK	64.0	27.7	2.4	32.6	61.5	73.5	12.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 31HE0013-HO-01
Date : 04/22/2011
Temperature/ Humidity : 24 deg.C / 40% RH
Engineer : Katsunori Okai

Mode : 11b Tx 2412MHz + GSM850 848.8MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	52.4	27.7	2.3	32.6	49.8	73.9	24.1	
Hori	2397.500	PK	65.7	27.7	2.4	32.6	63.2	-	-	- See 20dBc Data Sheet
Hori	2400.000	PK	64.0	27.7	2.4	32.6	61.5	-	-	- See 20dBc Data Sheet
Hori	2390.000	AV	40.5	27.7	2.3	32.6	37.9	53.9	16.0	
Hori	2397.500	AV	57.2	27.7	2.4	32.6	54.7	-	-	- See 20dBc Data Sheet
Hori	2400.000	AV	53.7	27.7	2.4	32.6	51.2	-	-	- See 20dBc Data Sheet
Vert	2390.000	PK	50.0	27.7	2.3	32.6	47.4	73.9	26.5	
Vert	2397.500	PK	63.2	27.7	2.4	32.6	60.7	-	-	- See 20dBc Data Sheet
Vert	2400.000	PK	61.6	27.7	2.4	32.6	59.1	-	-	- See 20dBc Data Sheet
Vert	2390.000	AV	38.4	27.7	2.3	32.6	35.8	53.9	18.1	
Vert	2397.500	AV	55.1	27.7	2.4	32.6	52.6	-	-	- See 20dBc Data Sheet
Vert	2400.000	AV	51.2	27.7	2.4	32.6	48.7	-	-	- See 20dBc Data Sheet

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

20dBc Data Sheet

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	103.5	27.7	2.4	32.6	101.0	-	-	Carrier
Hori	2400.000	PK	53.8	27.7	2.4	32.6	51.3	81.0	29.7	
Hori	2397.500	PK	59.5	27.7	2.4	32.6	57.0	81.0	24.0	
Vert	2412.000	PK	101.5	27.7	2.4	32.6	99.0	-	-	Carrier
Vert	2400.000	PK	51.1	27.7	2.4	32.6	48.6	79.0	30.4	
Vert	2397.500	PK	56.6	27.7	2.4	32.6	54.1	79.0	24.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 31HE0013-HO-01
Date : 04/26/2011 05/03/2011
Temperature/ Humidity : 23 deg.C / 37% RH 20 deg.C / 39% RH
Engineer : Takumi Shimada Katsunori Okai
Above 1GHz Below 1GHz
Mode : 11b Tx 2437MHz + GSM850 848.8MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	45.023	QP	30.4	14.6	7.4	32.2	20.2	40.0	19.8	
Hori	100.223	QP	44.0	10.1	8.1	32.1	30.1	43.5	13.4	
Hori	159.762	QP	42.1	15.5	8.8	32.0	34.4	43.5	9.1	
Hori	191.999	QP	44.5	16.2	9.0	32.0	37.7	43.5	5.8	
Hori	527.997	QP	28.7	18.5	21.3	32.0	36.5	46.0	9.5	
Hori	623.992	QP	27.2	19.7	21.8	31.9	36.8	46.0	9.2	
Hori	720.052	QP	26.3	20.7	22.3	31.8	37.5	46.0	8.5	
Hori	959.162	QP	21.3	22.8	23.4	30.8	36.7	46.0	9.3	
Hori	4874.000	PK	42.0	31.8	5.0	31.9	46.9	73.9	27.0	
Hori	7311.000	PK	41.1	36.2	6.1	32.4	51.0	73.9	22.9	NS
Hori	9748.000	PK	41.6	38.1	6.7	32.9	53.5	73.9	20.4	NS
Hori	24370.000	PK	47.1	37.9	-1.3	31.4	52.3	73.9	21.6	NS
Hori	4874.000	AV	29.2	31.8	5.0	31.9	34.1	53.9	19.8	
Hori	7311.000	AV	29.5	36.2	6.1	32.4	39.4	53.9	14.5	NS
Hori	9748.000	AV	29.5	38.1	6.7	32.9	41.4	53.9	12.5	NS
Hori	24370.000	AV	34.8	37.9	-1.3	31.4	40.0	53.9	13.9	NS
Vert	41.827	QP	39.6	15.0	7.3	32.2	29.7	40.0	10.3	
Vert	100.228	QP	46.4	10.1	8.1	32.1	32.5	43.5	11.0	
Vert	166.749	QP	39.4	15.6	8.8	32.0	31.8	43.5	11.7	
Vert	191.996	QP	42.1	16.2	9.0	32.0	35.3	43.5	8.2	
Vert	527.996	QP	26.1	18.5	21.3	32.0	33.9	46.0	12.1	
Vert	623.994	QP	25.1	19.7	21.8	31.9	34.7	46.0	11.3	
Vert	720.053	QP	23.4	20.7	22.3	31.8	34.6	46.0	11.4	
Vert	959.163	QP	21.2	22.8	23.4	30.8	36.6	46.0	9.4	
Vert	4874.000	PK	46.1	31.8	5.0	31.9	51.0	73.9	22.9	
Vert	7311.000	PK	41.2	36.2	6.1	32.4	51.1	73.9	22.8	NS
Vert	9748.000	PK	41.4	38.1	6.7	32.9	53.3	73.9	20.6	NS
Vert	24370.000	PK	47.3	37.9	-1.3	31.4	52.5	73.9	21.4	NS
Vert	4874.000	AV	31.1	31.8	5.0	31.9	36.0	53.9	17.9	
Vert	7311.000	AV	29.5	36.2	6.1	32.4	39.4	53.9	14.5	NS
Vert	9748.000	AV	29.5	38.1	6.7	32.9	41.4	53.9	12.5	NS
Vert	24370.000	AV	34.8	37.9	-1.3	31.4	40.0	53.9	13.9	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
 26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

NS:No Signal Detect

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 31HE0013-HO-01
Date : 04/26/2011
Temperature/ Humidity : 23 deg.C / 37% RH
Engineer : Takumi Shimada

Mode : 11n-20 Tx 2412MHz + W-CDMA Band II 1907.6MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	62.4	27.7	2.3	32.6	59.8	73.9	14.1	
Hori	2400.000	PK	83.4	27.7	2.4	32.6	80.9	-	-	See 20dBc Data Sheet
Hori	2390.000	AV	46.5	27.7	2.3	32.6	43.9	53.9	10.0	
Hori	2400.000	AV	63.7	27.7	2.4	32.6	61.2	-	-	See 20dBc Data Sheet
Vert	2390.000	PK	59.0	27.7	2.3	32.6	56.4	73.9	17.5	
Vert	2400.000	PK	79.4	27.7	2.4	32.6	76.9	-	-	See 20dBc Data Sheet
Vert	2390.000	AV	43.6	27.7	2.3	32.6	41.0	53.9	12.9	
Vert	2400.000	AV	59.3	27.7	2.4	32.6	56.8	-	-	See 20dBc Data Sheet

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

20dBc Data Sheet

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	98.4	27.7	2.4	32.6	95.9	-	-	Carrier
Hori	2400.000	PK	67.5	27.7	2.4	32.6	65.0	75.9	10.9	
Vert	2412.000	PK	97.0	27.7	2.4	32.6	94.5	-	-	Carrier
Vert	2400.000	PK	62.2	27.7	2.4	32.6	59.7	74.5	14.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. 31HE0013-HO-01
Date 04/26/2011 05/03/2011
Temperature/ Humidity 23 deg.C / 37% RH 20 deg.C / 39% RH
Engineer Takumi Shimada Katsunori Okai
Above 1GHz Below 1GHz
Mode 11n-20 Tx 2437MHz + W-CDMA Band II 1907.6MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	45.001	QP	26.4	14.6	7.4	32.2	16.2	40.0	23.8	
Hori	100.224	QP	43.5	10.1	8.1	32.1	29.6	43.5	13.9	
Hori	157.503	QP	41.2	15.4	8.7	32.0	33.3	43.5	10.2	
Hori	203.292	QP	33.7	16.6	9.1	32.0	27.4	43.5	16.1	
Hori	383.994	QP	34.7	17.1	10.5	32.0	30.3	46.0	15.7	
Hori	479.998	QP	33.5	18.0	11.1	32.0	30.6	46.0	15.4	
Hori	719.989	QP	36.2	20.7	12.4	31.8	37.5	46.0	8.5	
Hori	4874.000	PK	41.4	31.8	5.0	31.9	46.3	73.9	27.6	
Hori	7311.000	PK	42.3	36.2	6.1	32.4	52.2	73.9	21.7	NS
Hori	9748.000	PK	42.7	38.1	6.7	32.9	54.6	73.9	19.3	NS
Hori	24370.000	PK	47.0	37.9	-1.3	31.4	52.2	73.9	21.7	NS
Hori	4874.000	AV	28.6	31.8	5.0	31.9	33.5	53.9	20.4	
Hori	7311.000	AV	29.4	36.2	6.1	32.4	39.3	53.9	14.6	NS
Hori	9748.000	AV	29.5	38.1	6.7	32.9	41.4	53.9	12.5	NS
Hori	24370.000	AV	34.7	37.9	-1.3	31.4	39.9	53.9	14.0	NS
Vert	41.725	QP	38.7	15.0	7.3	32.2	28.8	40.0	11.2	
Vert	100.227	QP	46.0	10.1	8.1	32.1	32.1	43.5	11.4	
Vert	164.842	QP	39.9	15.6	8.8	32.0	32.3	43.5	11.2	
Vert	203.291	QP	36.8	16.6	9.1	32.0	30.5	43.5	13.0	
Vert	383.996	QP	32.6	17.1	10.5	32.0	28.2	46.0	17.8	
Vert	466.199	QP	33.9	17.9	11.0	32.0	30.8	46.0	15.2	
Vert	719.991	QP	31.6	20.7	12.4	31.8	32.9	46.0	13.1	
Vert	4874.000	PK	42.1	31.8	5.0	31.9	47.0	73.9	26.9	
Vert	7311.000	PK	40.8	36.2	6.1	32.4	50.7	73.9	23.2	NS
Vert	9748.000	PK	40.5	38.1	6.7	32.9	52.4	73.9	21.5	NS
Vert	24370.000	PK	47.2	37.9	-1.3	31.4	52.4	73.9	21.5	NS
Vert	4874.000	AV	29.8	31.8	5.0	31.9	34.7	53.9	19.2	
Vert	7311.000	AV	29.4	36.2	6.1	32.4	39.3	53.9	14.6	NS
Vert	9748.000	AV	29.6	38.1	6.7	32.9	41.5	53.9	12.4	NS
Vert	24370.000	AV	34.6	37.9	-1.3	31.4	39.8	53.9	14.1	NS

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

NS:No Signal Detect

Radiated Spurious Emission

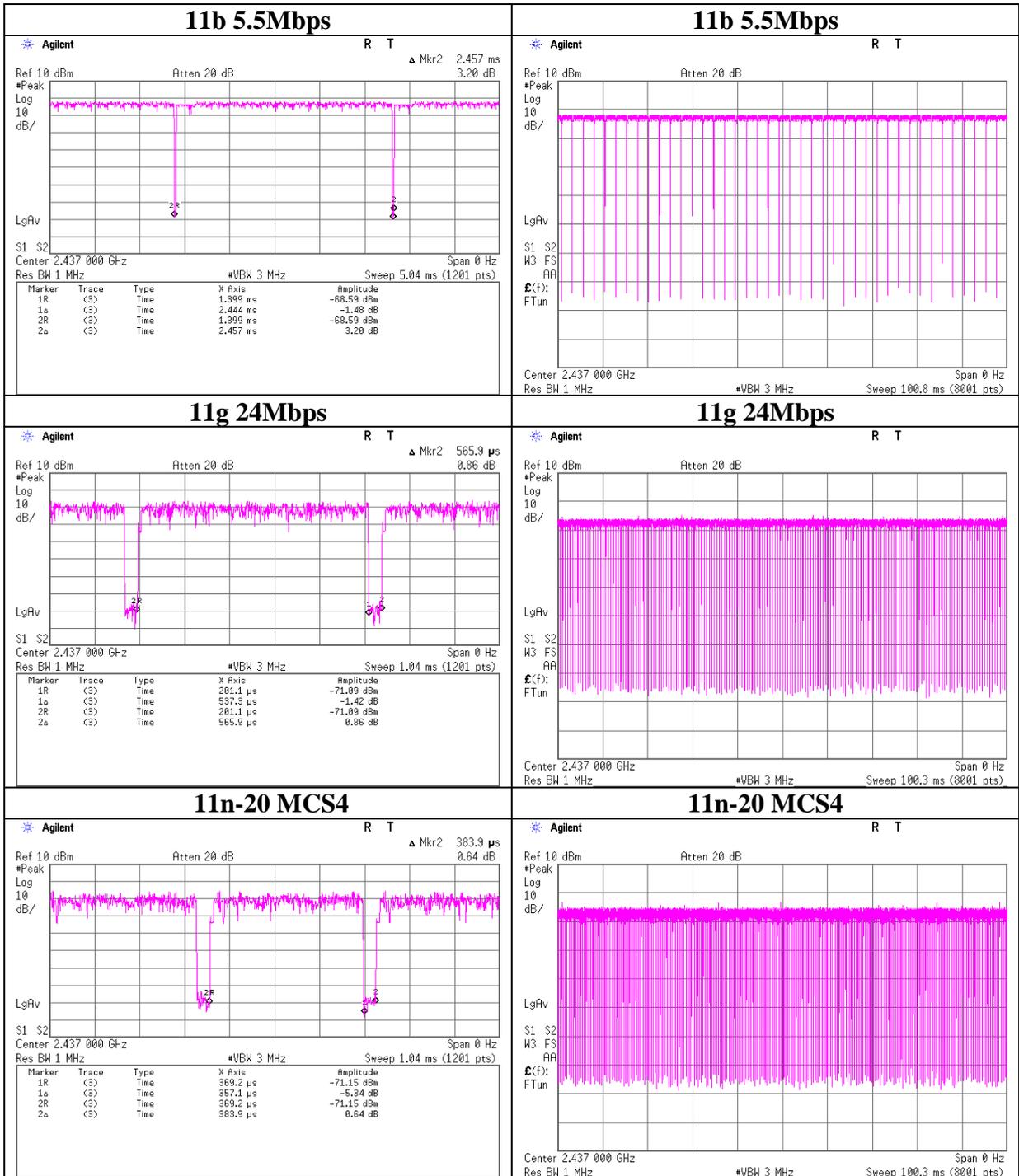
Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 31HE0013-HO-01
Date : 04/26/2011
Temperature/ Humidity : 23 deg.C / 37% RH
Engineer : Takumi Shimada

Mode : 11n-20 Tx 2462MHz + W-CDMA Band II 1907.6MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	65.1	27.6	2.4	32.6	62.5	73.9	11.4	
Hori	2483.500	AV	49.9	27.6	2.4	32.6	47.3	53.9	6.6	
Vert	2483.500	PK	59.7	27.6	2.4	32.6	57.1	73.9	16.8	
Vert	2483.500	AV	44.6	27.6	2.4	32.6	42.0	53.9	11.9	

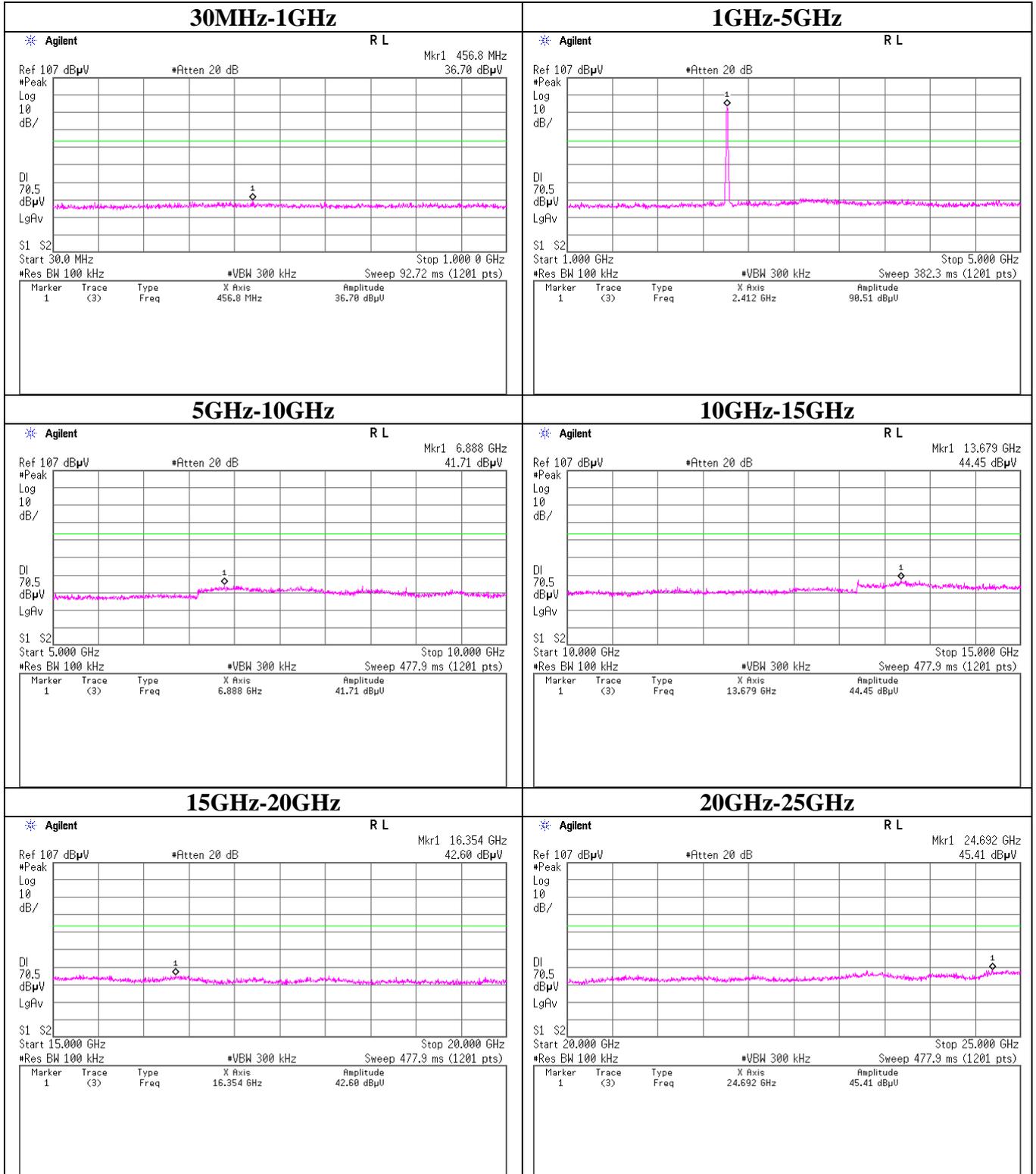
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

The tested burst timing



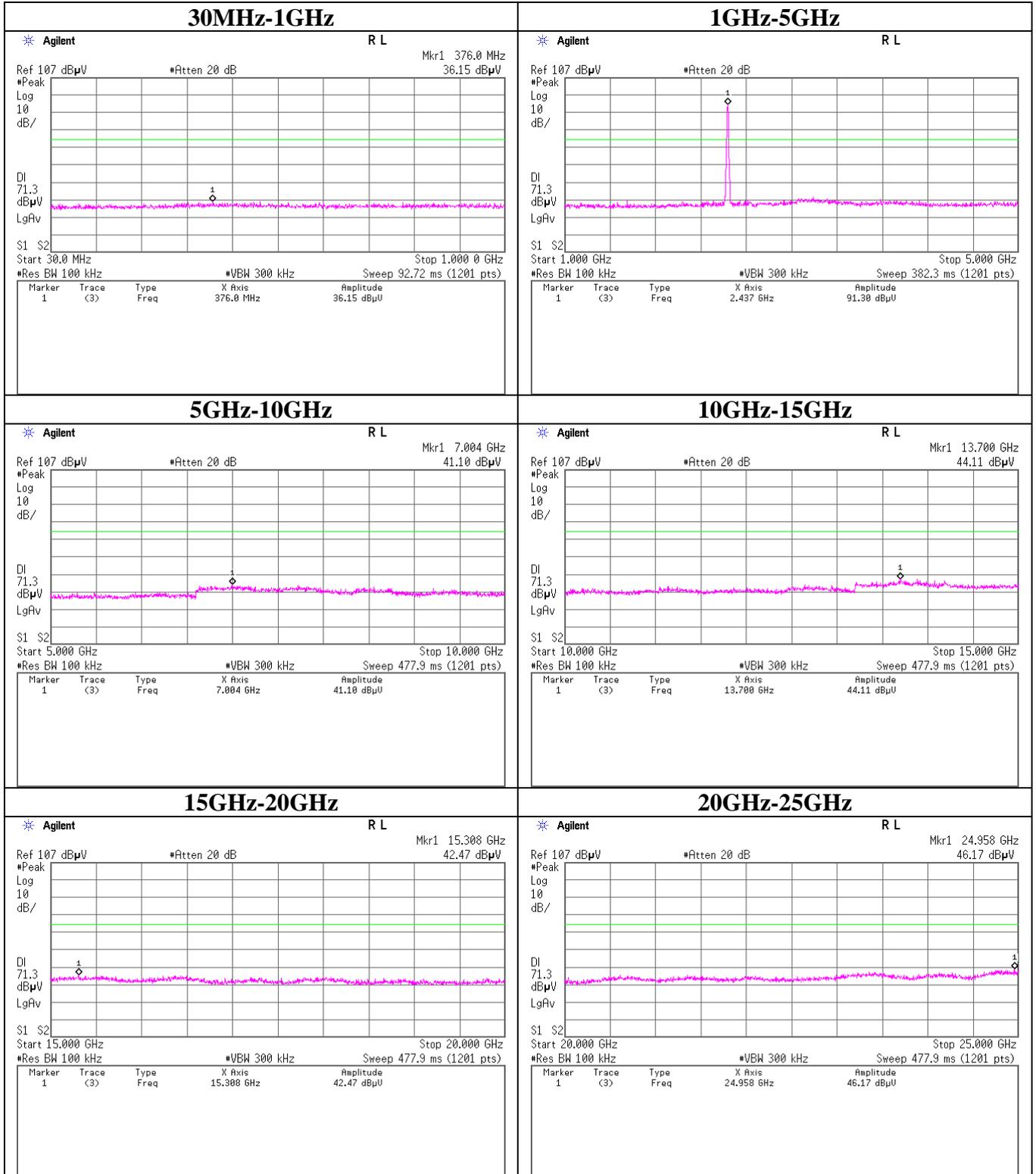
Conducted Spurious Emission

11b Tx 2412MHz



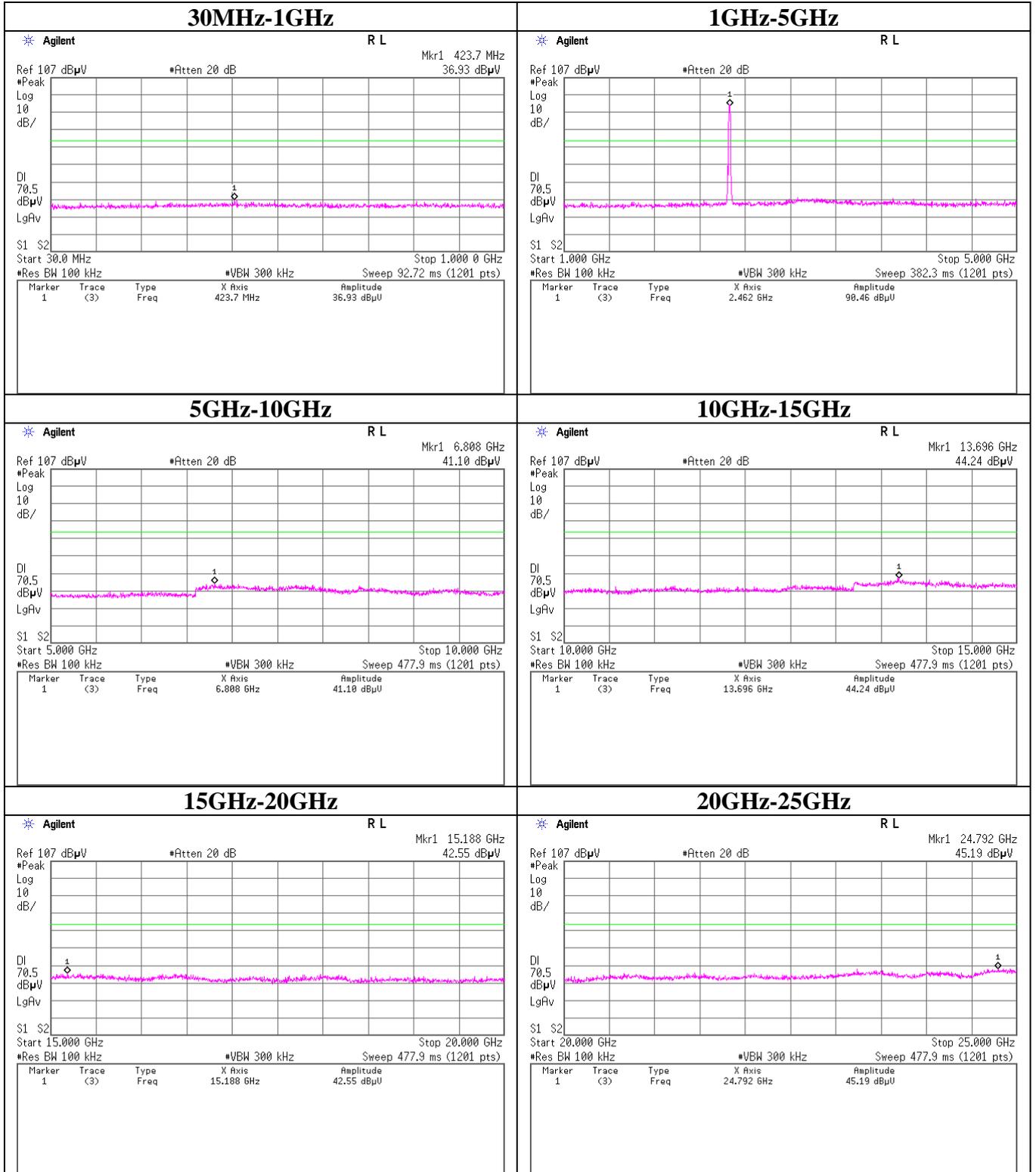
Conducted Spurious Emission

11b Tx 2437MHz



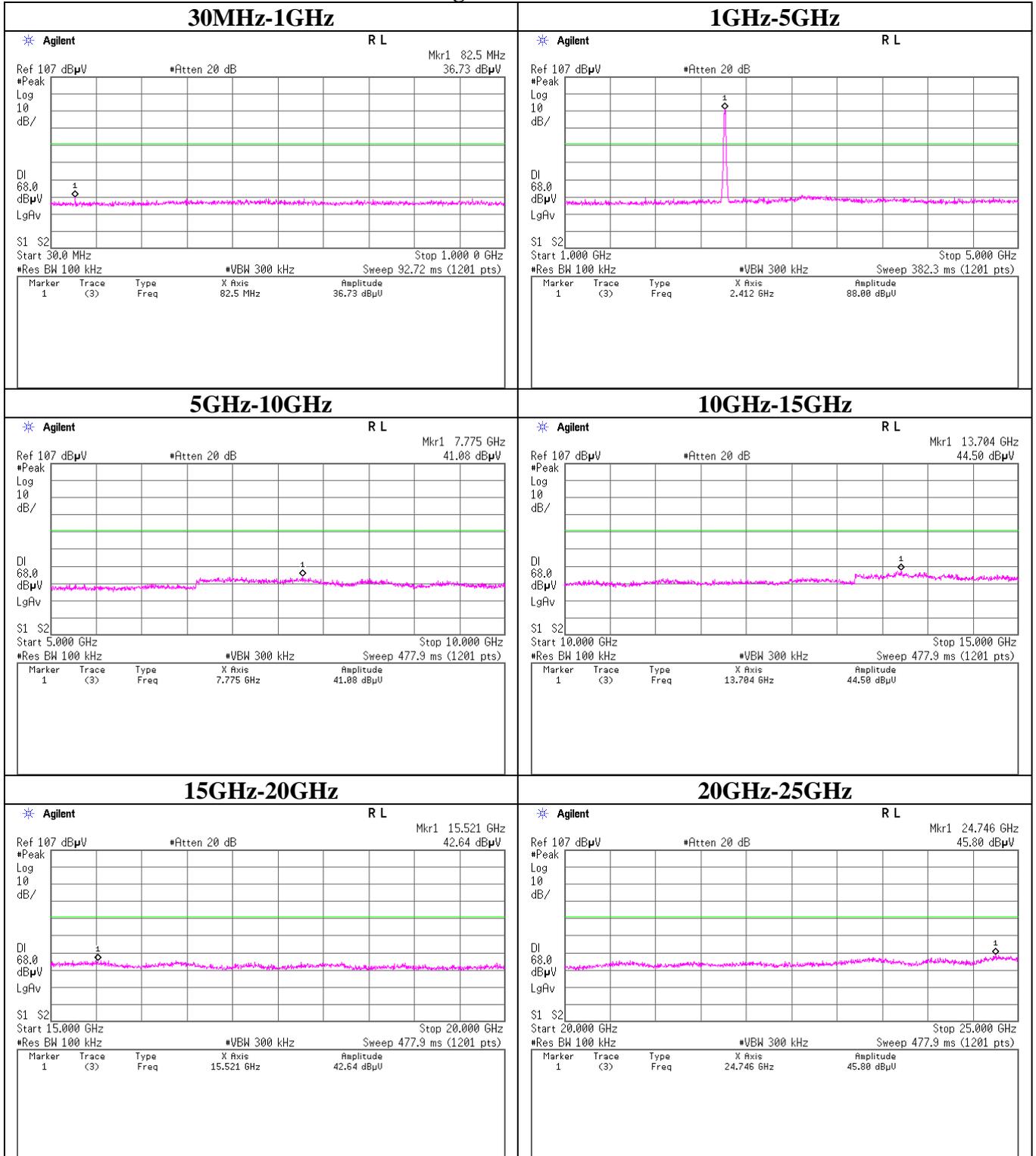
Conducted Spurious Emission

11b Tx 2462MHz



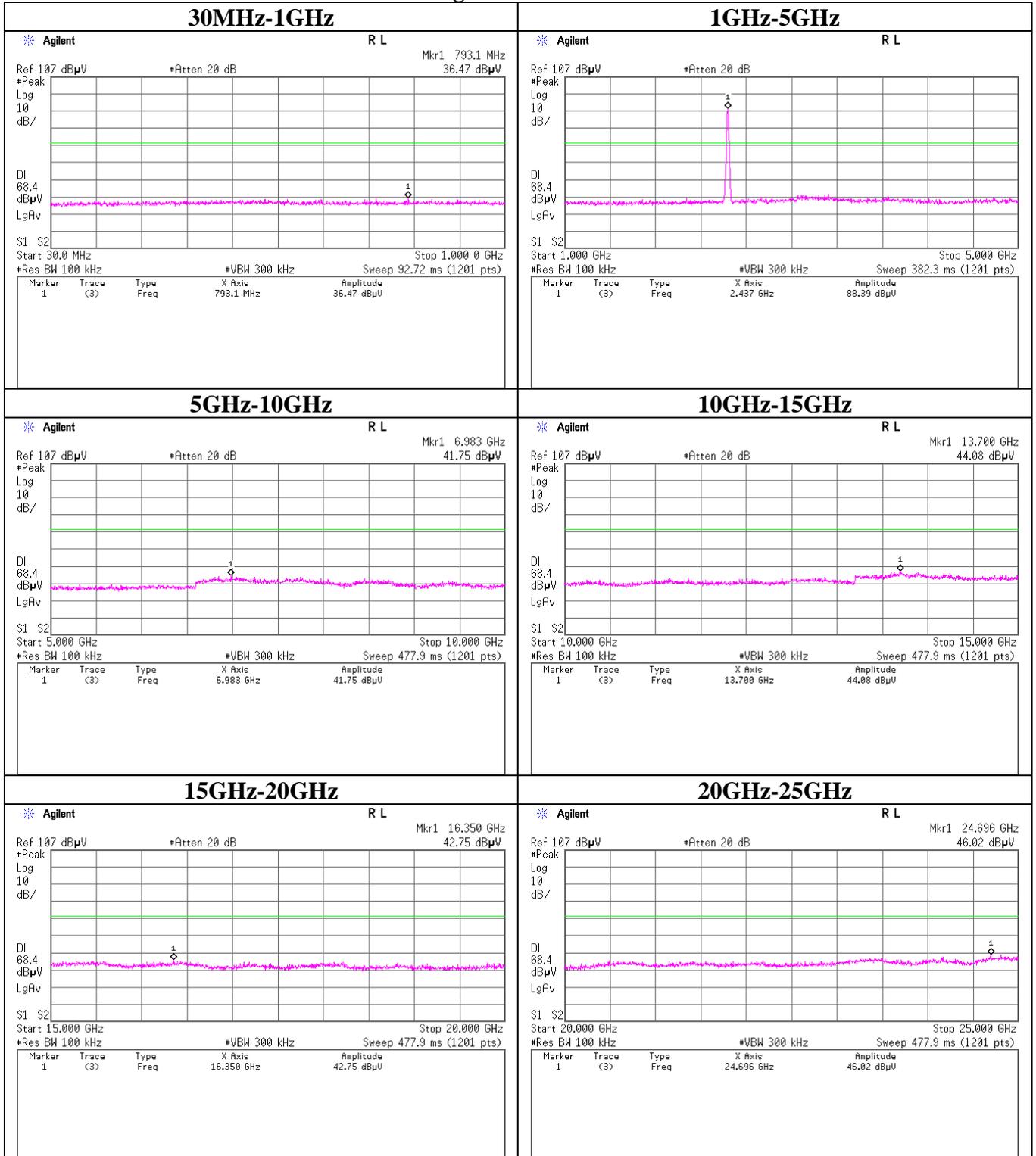
Conducted Spurious Emission

11g Tx 2412MHz



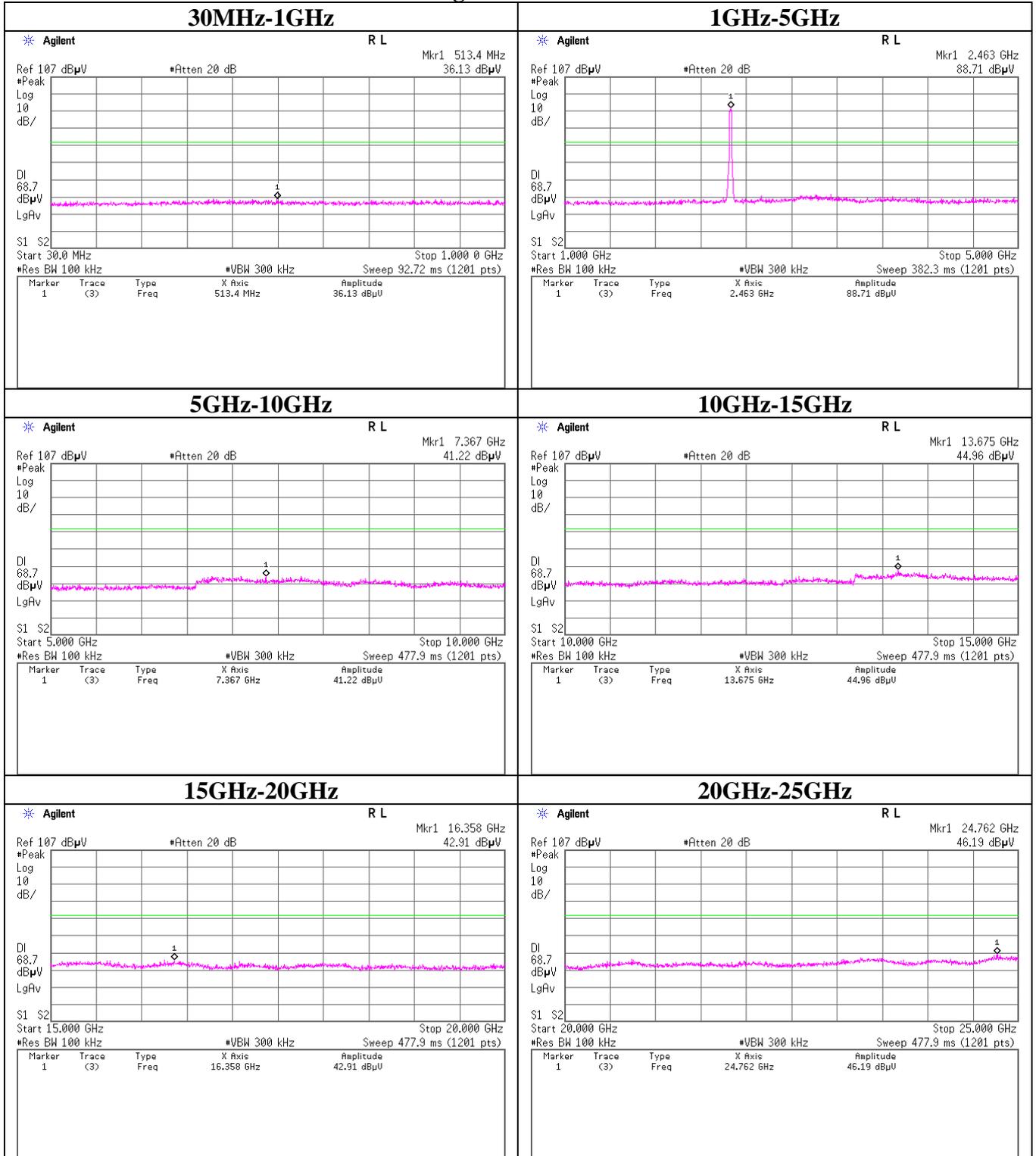
Conducted Spurious Emission

11g Tx 2437MHz



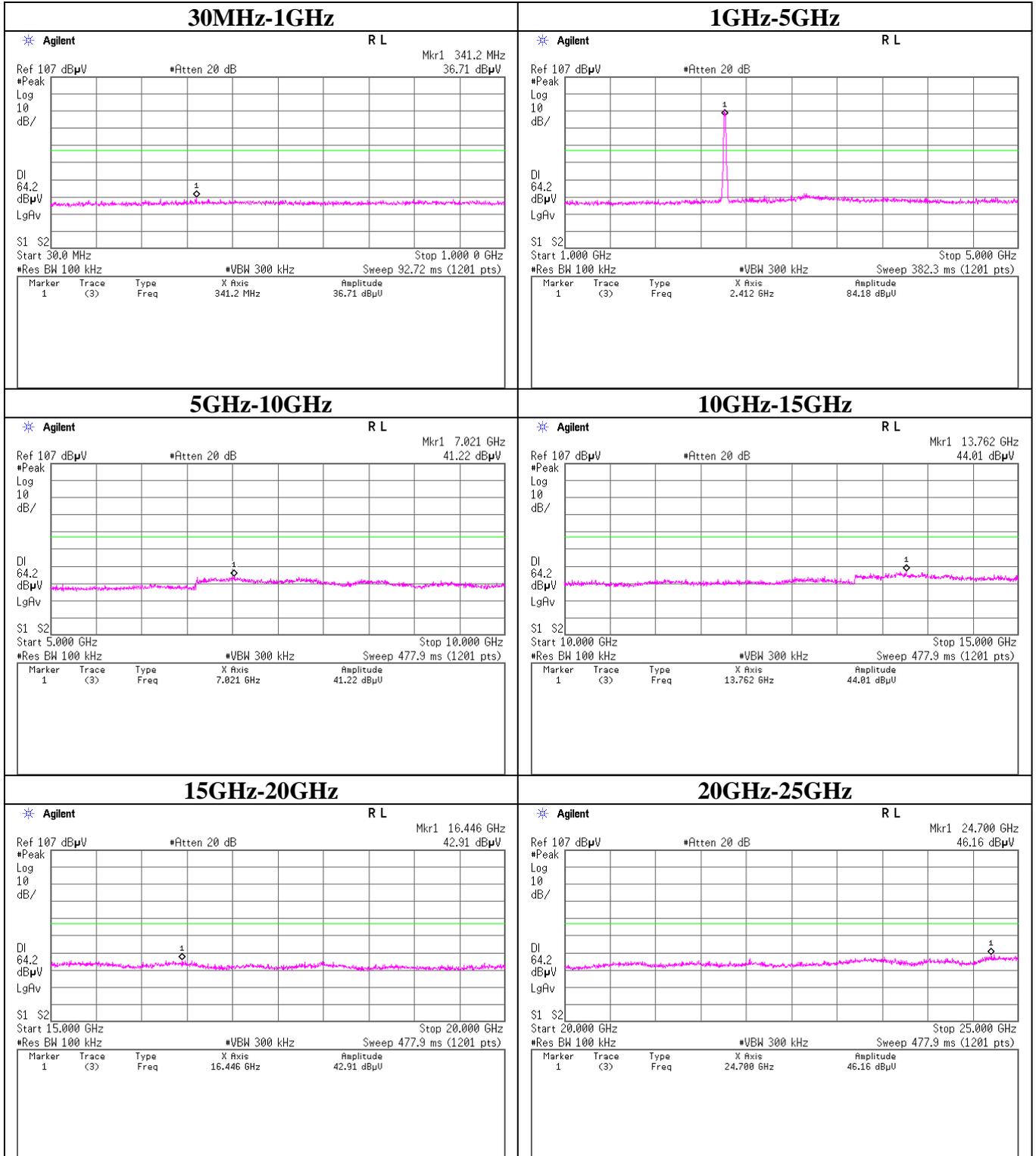
Conducted Spurious Emission

11g Tx 2462MHz



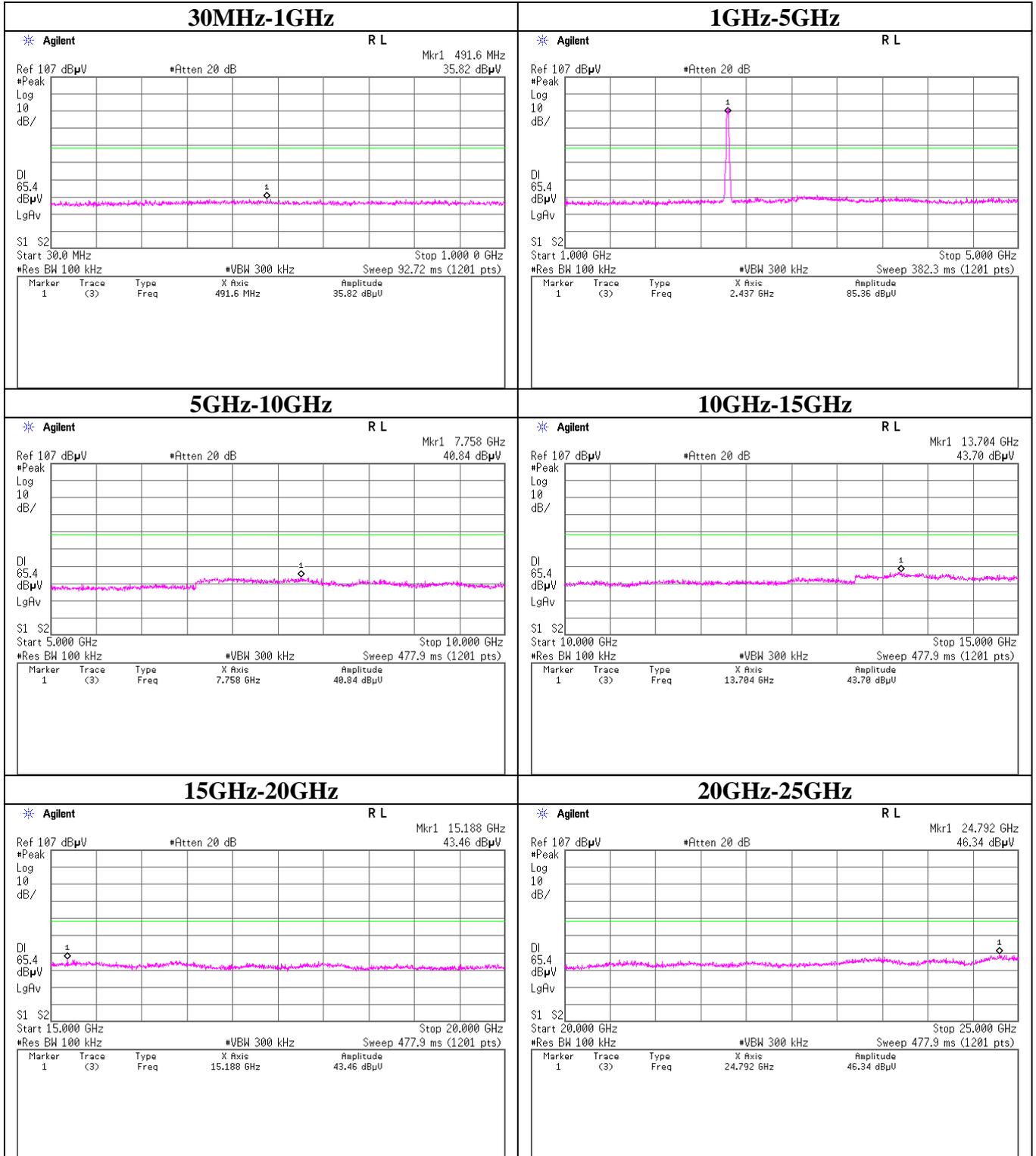
Conducted Spurious Emission

11n-20 Tx 2412MHz



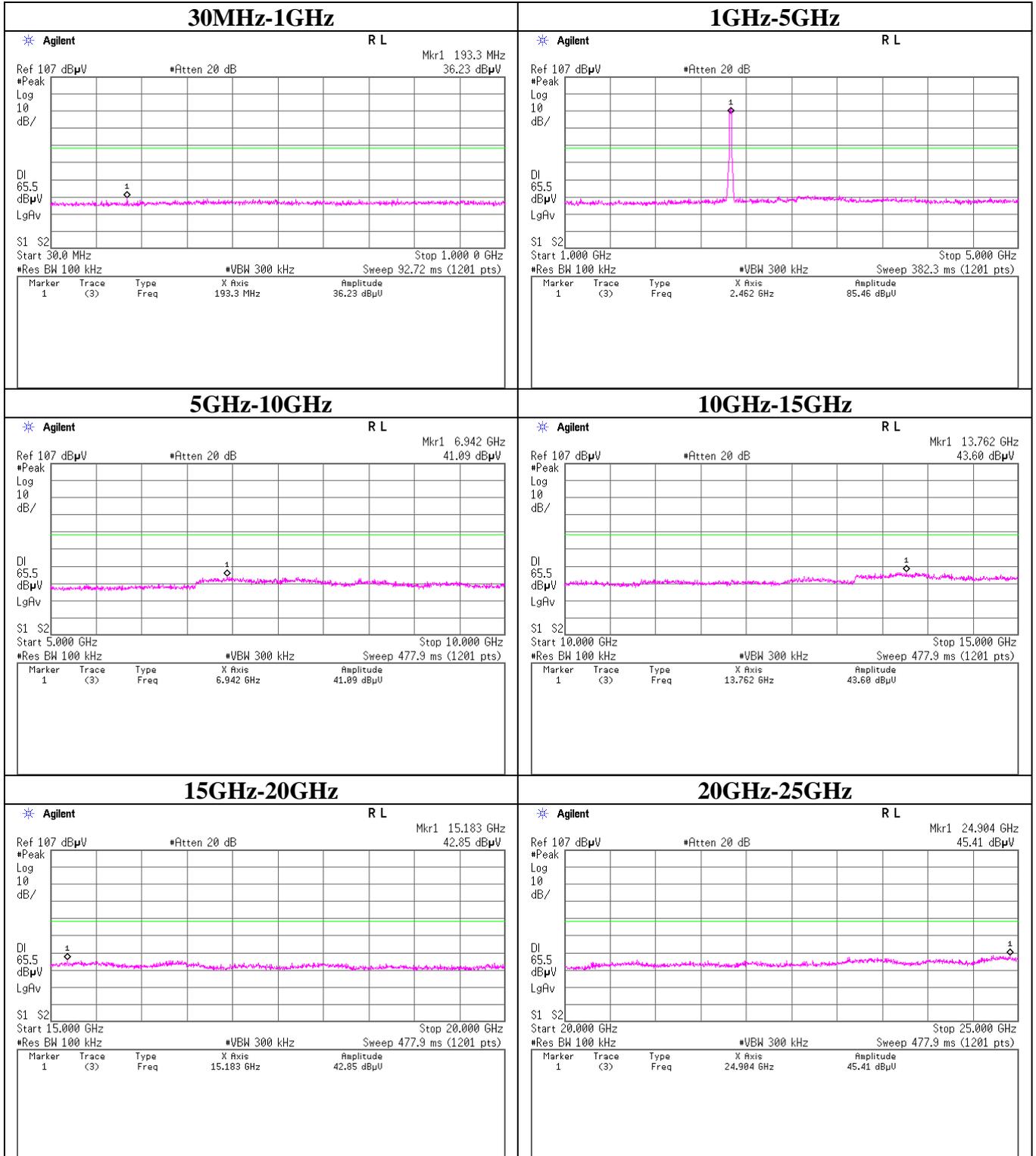
Conducted Spurious Emission

11n-20 Tx 2437MHz



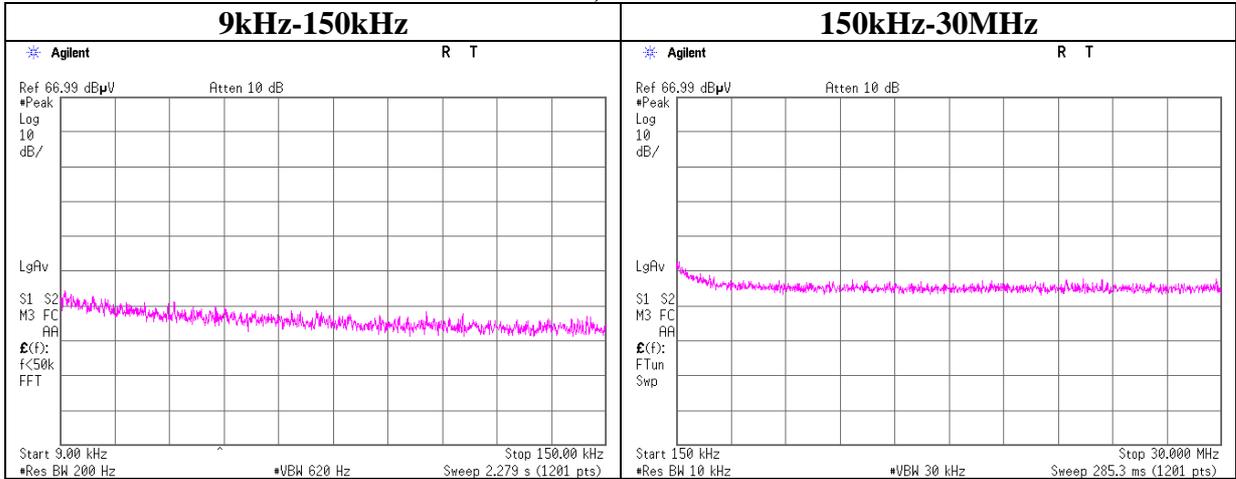
Conducted Spurious Emission

11n-20 Tx 2462MHz

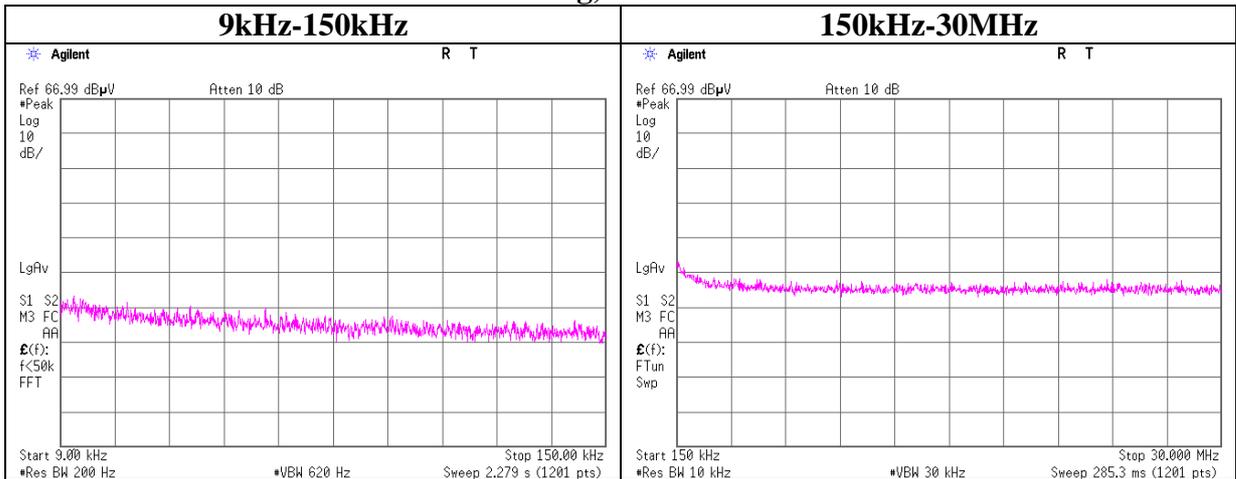


Conducted Spurious Emission(below 30MHz)

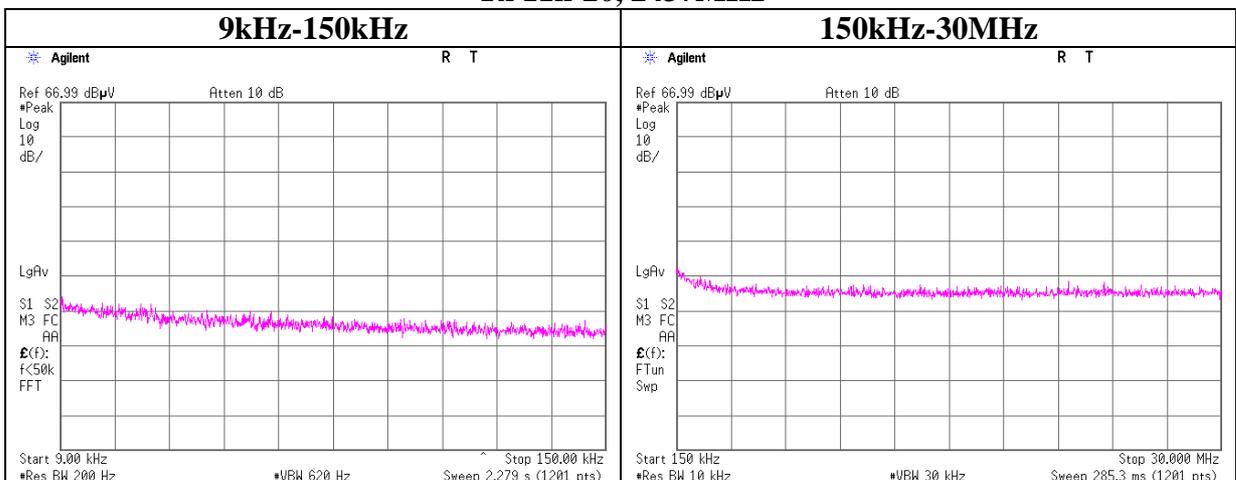
Tx 11b, 2437MHz



Tx 11g, 2437MHz

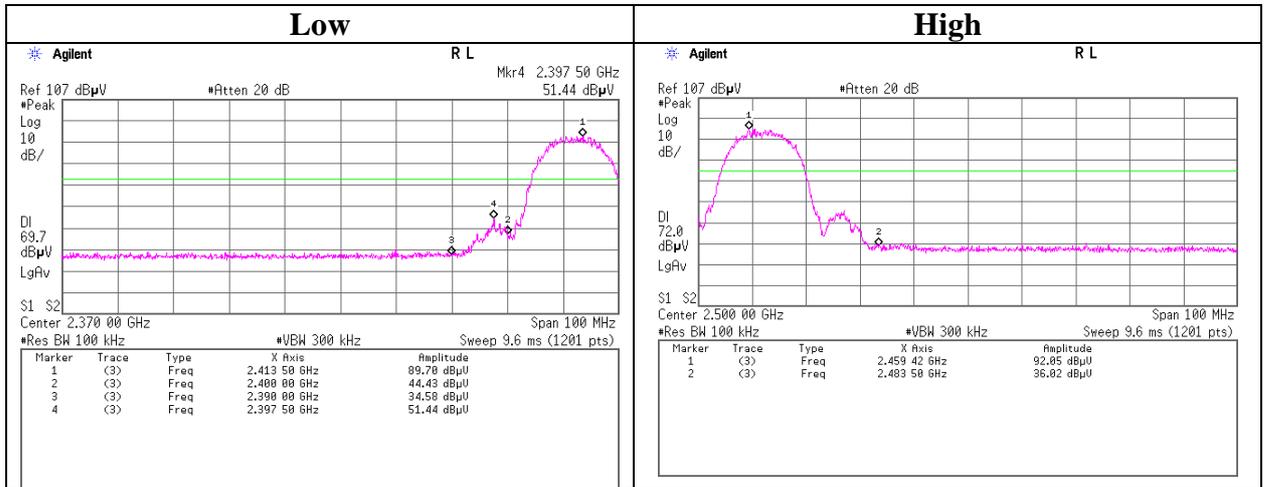


Tx 11n-20, 2437MHz

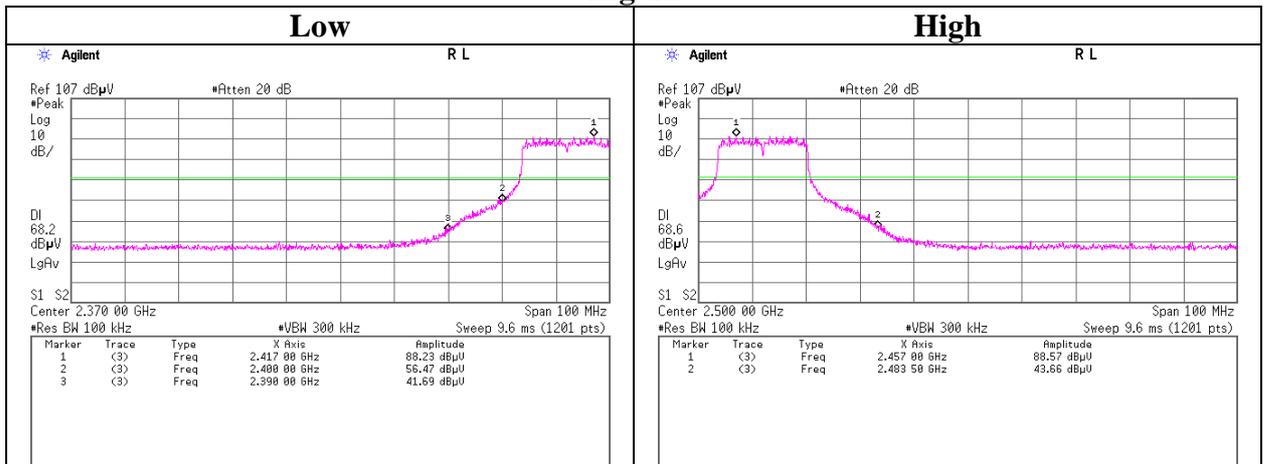


Conducted Emission Band Edge compliance

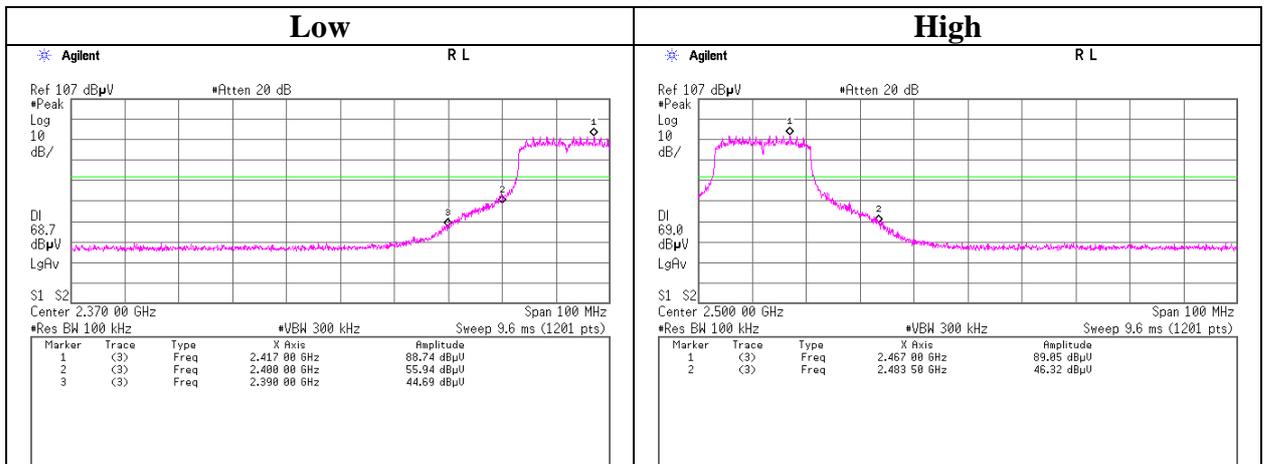
11b Tx



11g Tx



11n-20 Tx



Power Density

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 31HE0013-HO-01
Date 02/16/2011
Temperature/ Humidity 21 deg.C / 31% RH
Engineer Keisuke Kawamura
Mode 11b Tx, 11g Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-11.31	0.97	9.97	-0.37	8.00	8.37
2437.00	-10.12	0.98	9.97	0.83	8.00	7.17
2462.00	-10.48	0.98	9.97	0.47	8.00	7.53

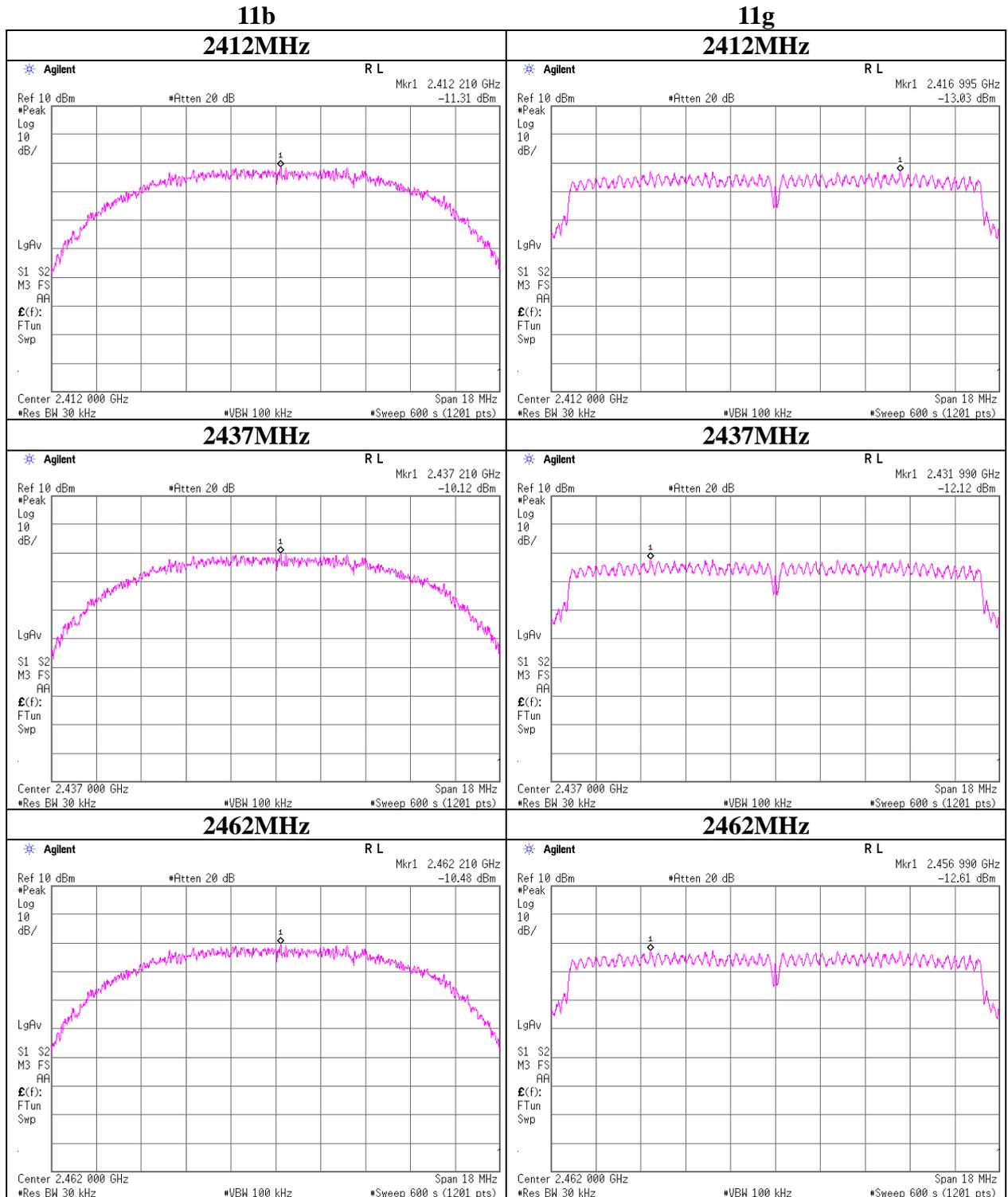
11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-13.03	0.97	9.97	-2.09	8.00	10.09
2437.00	-12.12	0.98	9.97	-1.17	8.00	9.17
2462.00	-12.61	0.98	9.97	-1.66	8.00	9.66

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Power Density



Power Density

Test place Head Office EMC Lab. No.6 Measurement Room
Report No. 31HE0013-HO-01
Date 02/16/2011
Temperature/ Humidity 21 deg.C / 31% RH
Engineer Keisuke Kawamura
Mode 11n-20 Tx

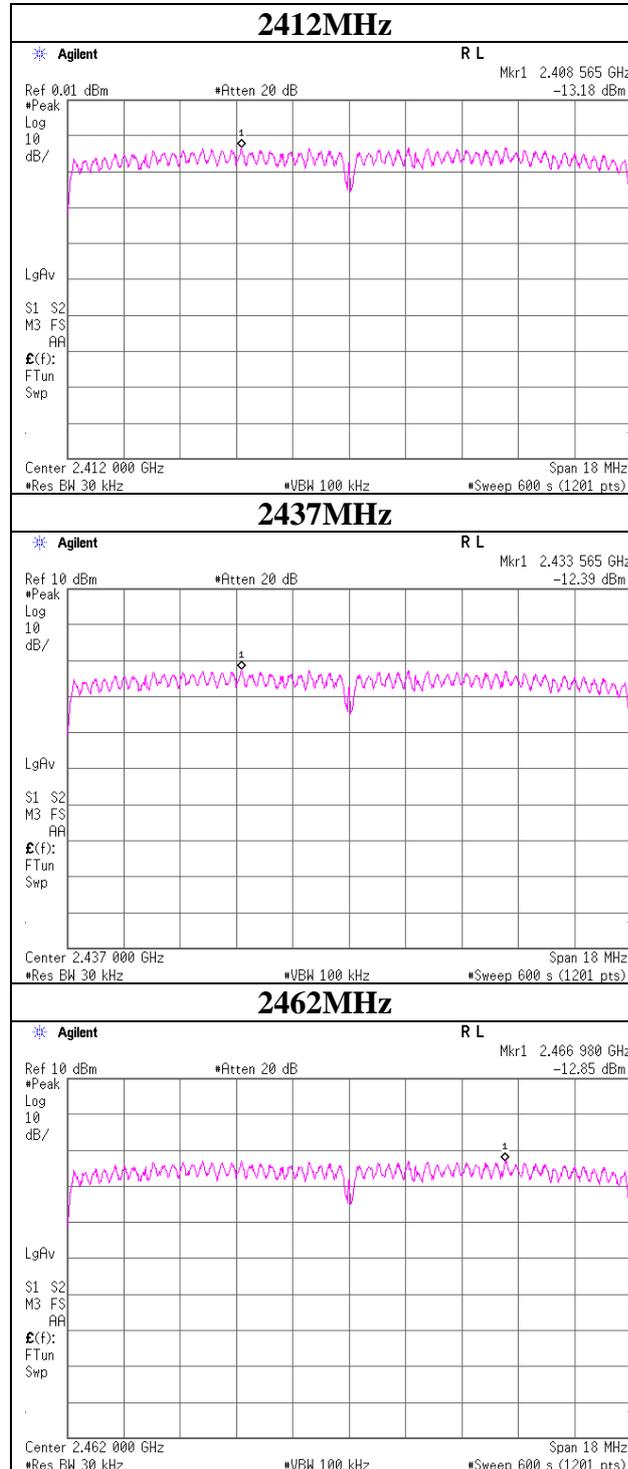
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit [dBm]	Margin [dB]
				[dBm]	[mW]		
2412.00	-13.18	0.97	9.97	-2.24	0.60	8.00	10.24
2437.00	-12.39	0.98	9.97	-1.44	0.72	8.00	9.44
2462.00	-12.85	0.98	9.97	-1.90	0.65	8.00	9.90

Sample Calculation:

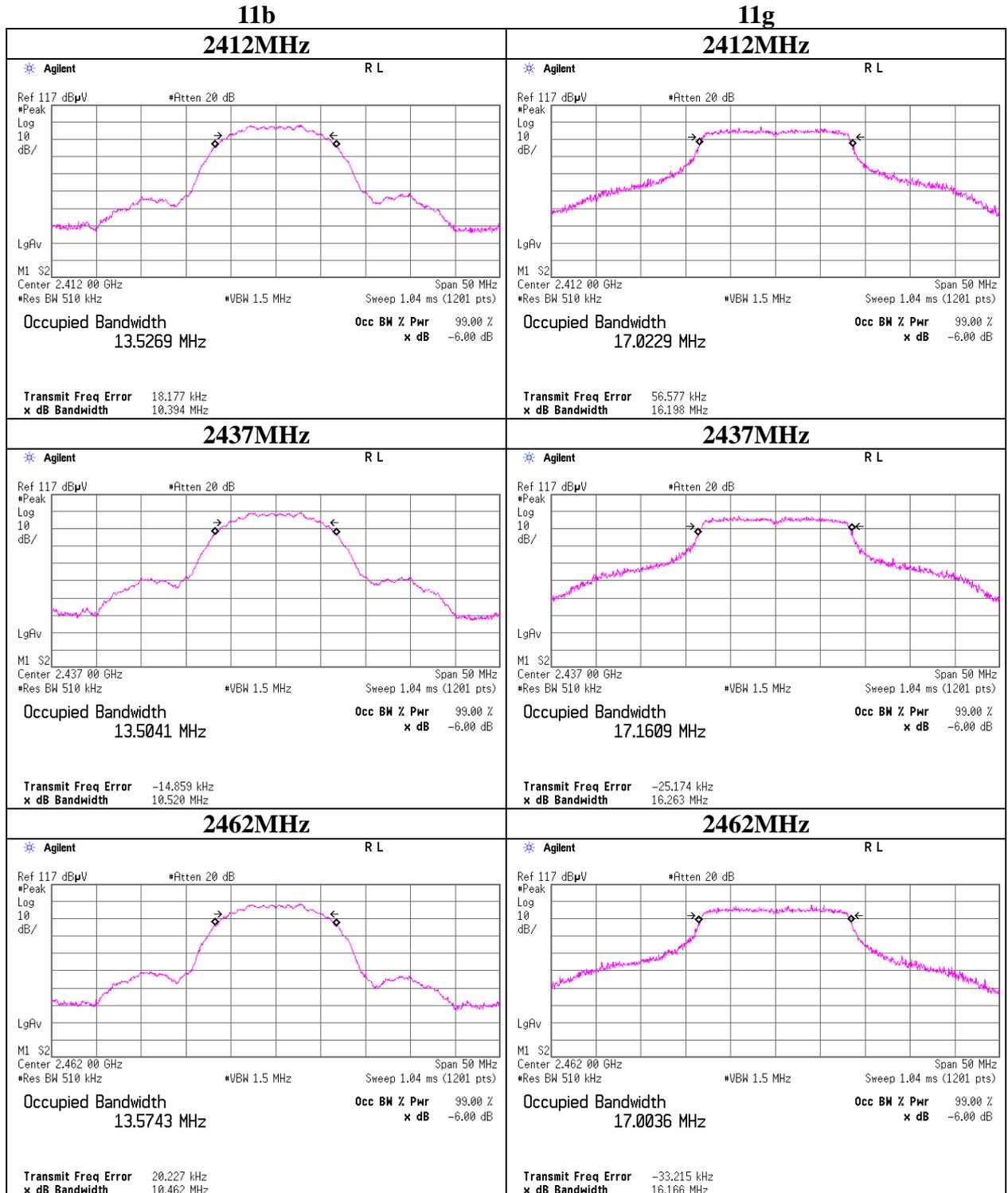
Result = Reading + Cable Loss + Attenuator

Power Density

11n-20



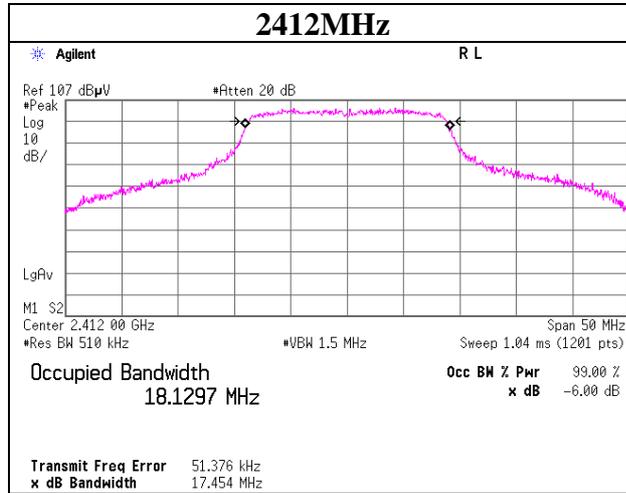
99%Occupied Bandwidth



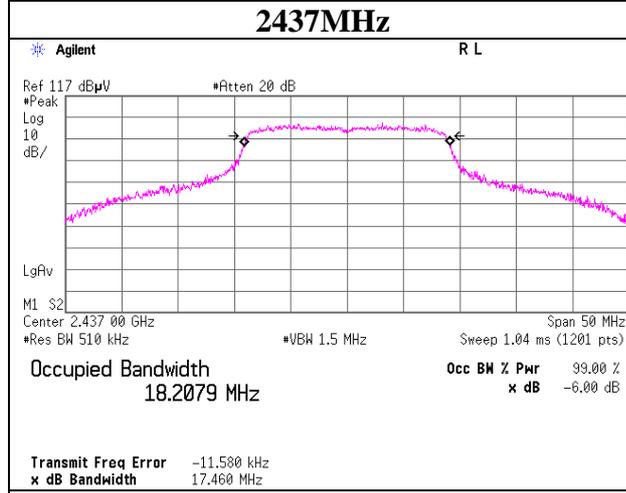
99% Occupied Bandwidth

11n-20

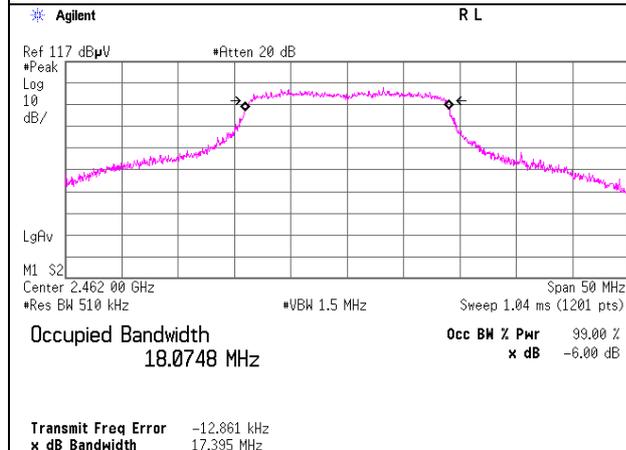
2412MHz



2437MHz



2462MHz



APPENDIX 3: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2011/02/22 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2011/02/23 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE/CE	2010/11/30 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2010/05/07 * 12
MCC-58	Microwave Cable	Suhner	SUCOFLEX104	246770(1m) / 250655(5m)	RE	2011/03/02 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2011/03/10 * 12
MHF-19	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	602	RE	2010/09/21 * 12
MCC-76	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278967/4	RE	2010/12/03 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA917030 6	RE	2010/05/07 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2010/08/23 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2010/10/11 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2010/10/11 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2010/07/06 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2010/11/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2011/03/04 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(AE)	2011/02/20 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(EUT)	2011/02/22 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2011/01/05 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM1 41(3m)/sucofor m141-PE(1m)/421- 010(1.5m)/RFM -E321(Switcher)	-/00640	CE	2010/07/23 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2011/02/22 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE/AT	2011/02/15 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	RE	2010/11/05 * 12

EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MCC-114	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	290212/4	AT	2010/08/05 * 12
MAT-21	Attenuator(20dB)(above1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-120	901247	AT	2011/01/06 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2010/09/10 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2010/09/10 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2010/05/19 * 12
MAT-24	Attenuator(10dB)(above1GHz)	Agilent	8493C	71389	AT	2010/06/14 * 12
MURC-02	Wireless Communication Test Set	Agilent	E5515C	GB47050683	RE	2009/10/20 * 36

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**