

APPENDIX 2: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

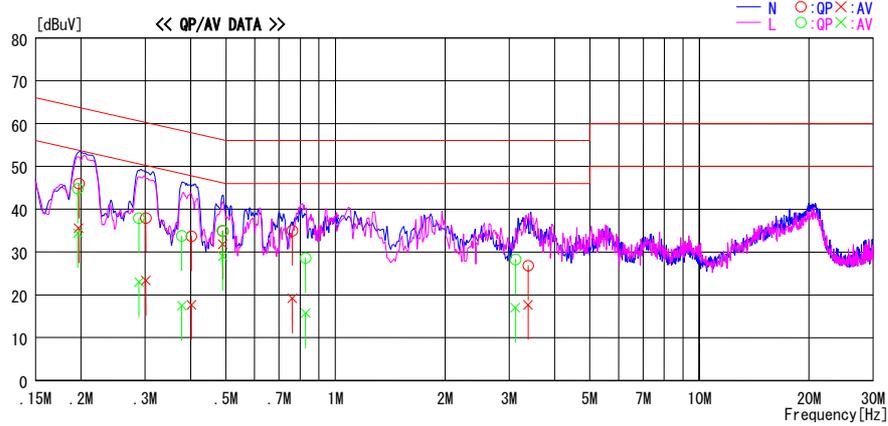
UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2010/06/01

Report No. : 30JE0235-HO-01

Temp./Humi. : 25deg. C / 45%
Engineer : Tomohisa Nakagawa

Mode / Remarks : WLAN 11b, Tx 2412MHz, 11Mbps

LIMIT : FCC15.207 QP
FCC15.207 AV

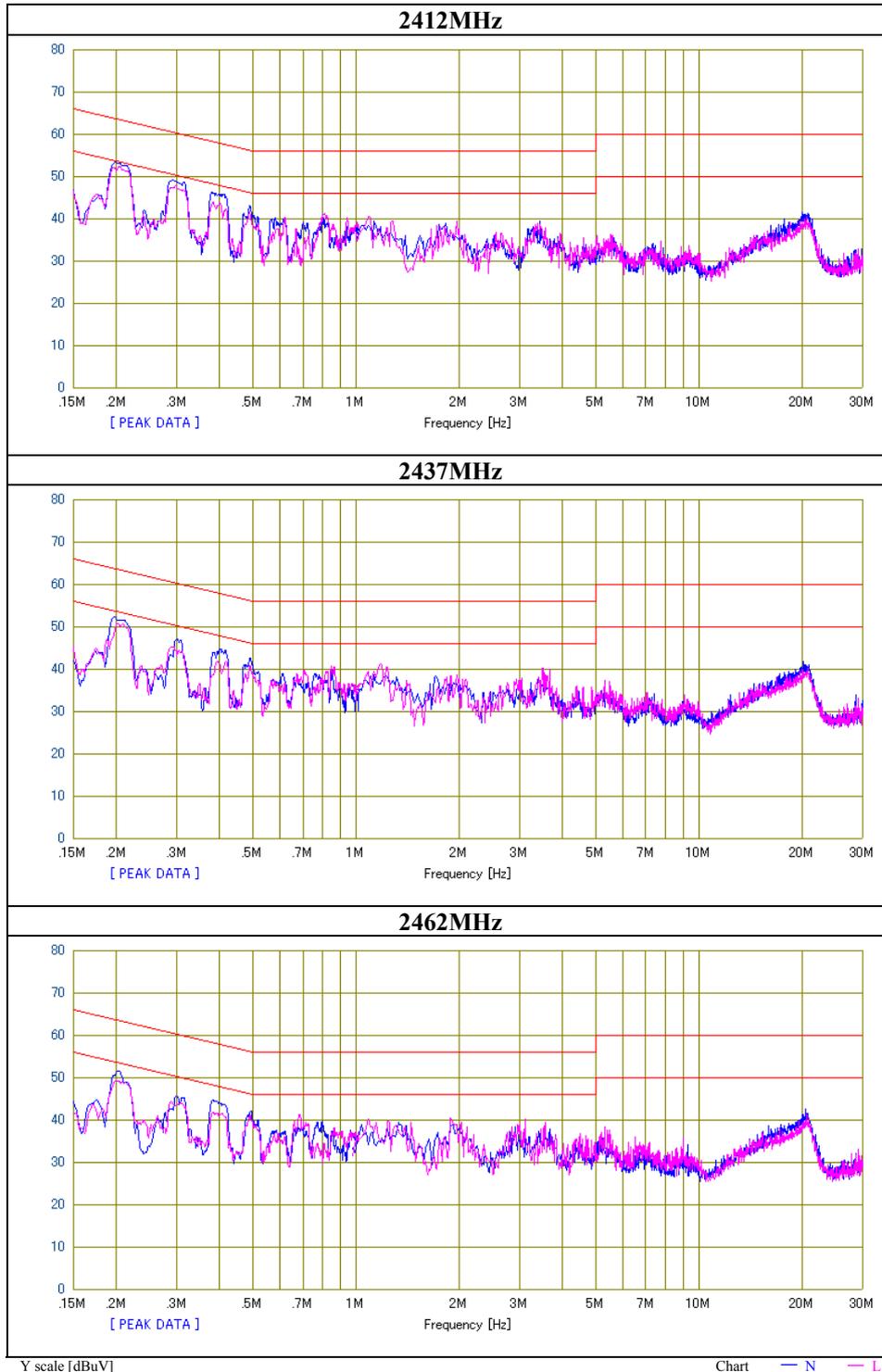


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.19712	32.7	22.3	13.3	46.0	35.6	63.7	53.7	17.7	18.1	N
0.30123	24.6	10.0	13.3	37.9	23.3	60.2	50.2	22.3	26.9	N
0.40224	20.4	4.4	13.3	33.7	17.7	57.8	47.8	24.1	30.1	N
0.49000	21.6	18.5	13.3	34.9	31.8	56.2	46.2	21.3	14.4	N
0.76160	21.6	5.8	13.4	35.0	19.2	56.0	46.0	21.0	26.8	N
3.38355	13.2	4.1	13.6	26.8	17.7	56.0	46.0	29.2	28.3	N
0.19590	31.5	21.1	13.3	44.8	34.4	63.8	53.8	19.0	19.4	L
0.28828	24.6	9.7	13.3	37.9	23.0	60.6	50.6	22.7	27.6	L
0.37833	20.5	4.1	13.3	33.8	17.4	58.3	48.3	24.5	30.9	L
0.48956	21.7	15.8	13.3	35.0	29.1	56.2	46.2	21.2	17.1	L
0.82805	15.2	2.3	13.4	28.6	15.7	56.0	46.0	27.4	30.3	L
3.12283	14.7	3.4	13.6	28.3	17.0	56.0	46.0	27.7	29.0	L

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT [dBuV]=READING [dBuV]+C. F [dB] (L1SN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	30JE0235-HO-01
Date	06/01/2010
Temperature/ Humidity	25 deg.C./ 45%
Engineer	Tomohisa Nakagawa
Mode	11b Tx



Conducted Emission

DATA OF CONDUCTED EMISSION TEST

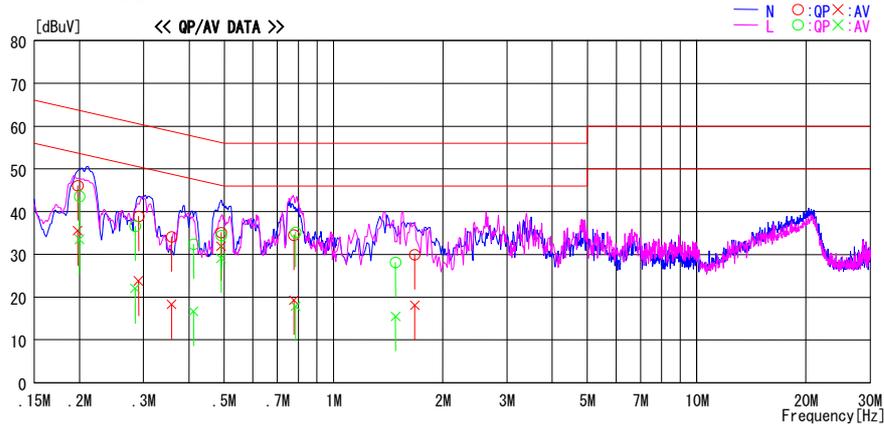
UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2010/06/02

Report No. : 30JE0235-HO-01

Temp./Humi. : 25deg. C / 45%
Engineer : Tomohisa Nakagawa

Mode / Remarks : WLAN 11b, Rx 2437MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.19738	32.8	22.2	13.3	46.1	35.5	63.7	53.7	17.6	18.2	N
0.29050	25.6	10.5	13.3	38.9	23.8	60.5	50.5	21.6	26.7	N
0.35825	20.8	5.0	13.3	34.1	18.3	58.8	48.8	24.7	30.5	N
0.48994	21.8	18.6	13.3	35.1	31.9	56.2	46.2	21.1	14.3	N
0.77739	21.1	5.9	13.4	34.5	19.3	56.0	46.0	21.5	26.7	N
1.67294	16.5	4.7	13.4	29.9	18.1	56.0	46.0	26.1	27.9	N
0.19973	30.3	20.2	13.3	43.6	33.5	63.6	53.6	20.0	20.1	L
0.28423	23.3	8.7	13.3	36.6	22.0	60.7	50.7	24.1	28.7	L
0.41169	19.1	3.4	13.3	32.4	16.7	57.6	47.6	25.2	30.9	L
0.48998	21.1	15.8	13.3	34.4	29.1	56.2	46.2	21.8	17.1	L
0.78623	21.8	4.5	13.4	35.2	17.9	56.0	46.0	20.8	28.1	L
1.48287	14.7	2.1	13.4	28.1	15.5	56.0	46.0	27.9	30.5	L

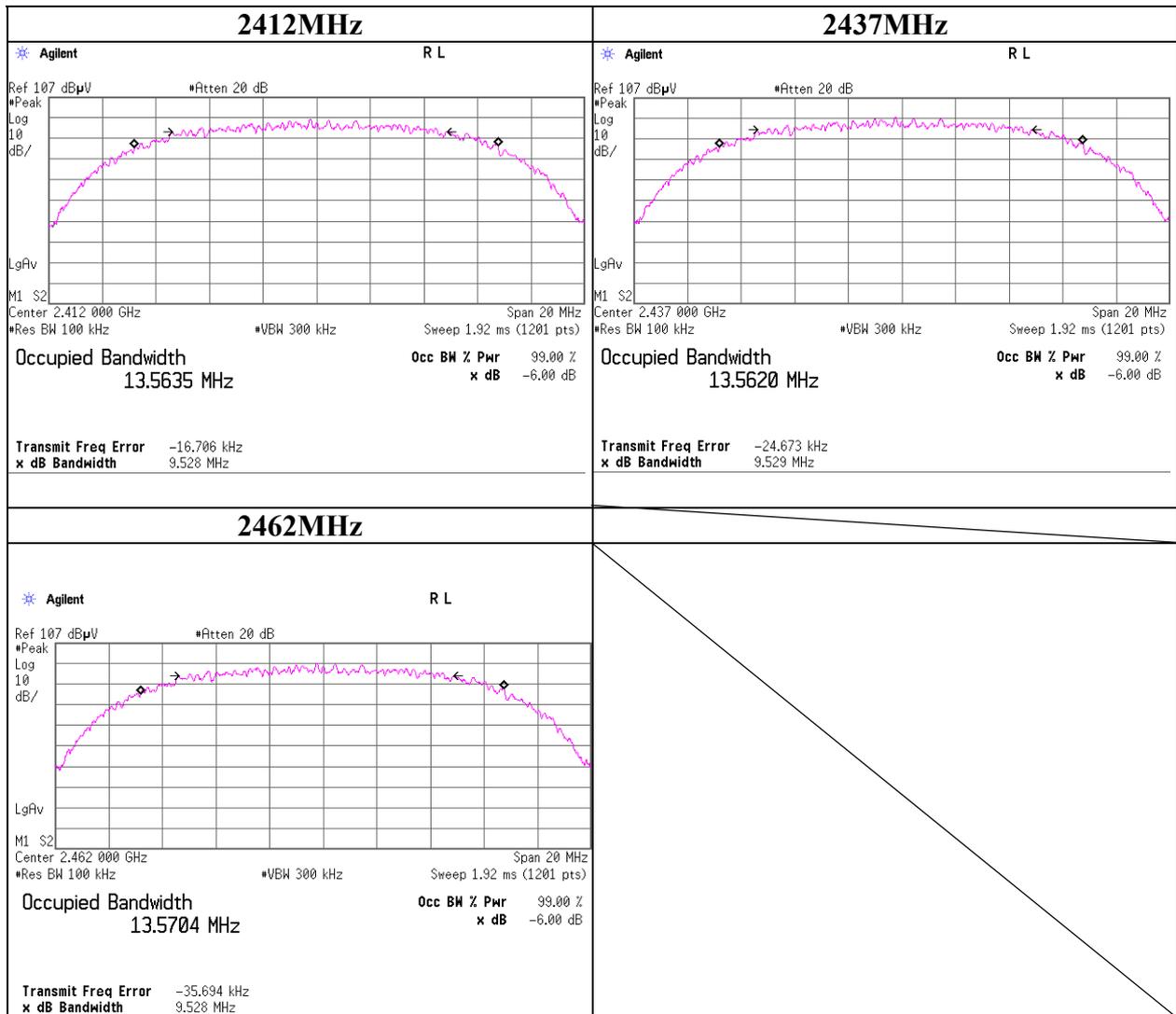
CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT [dBuV]=READING [dBuV]+C. F [dB] (L ISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

6dB Bandwidth

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	30JE0235-HO-01
Date	06/01/2010
Temperature/ Humidity	25 deg.C./ 50%
Engineer	Hiroshi Kukita
Mode	11b,Tx(Ch L,M,H),11Mbps

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	9.528	>500
2437	9.529	>500
2462	9.528	>500



Maximum Peak Output Power

Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	30JE0235-HO-01
Date	05/31/2010
Temperature/ Humidity	26 deg.C./ 44%
Engineer	Takumi Shimada
Mode	11b Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	0.93	1.10	10.00	12.03	15.96	30.00	1000	17.97
2437	1.57	1.10	10.00	12.67	18.49	30.00	1000	17.33
2462	0.96	1.10	10.00	12.06	16.07	30.00	1000	17.94

Sample Calculation:

Result = Reading + Cable Loss (customer supplied) + Attenuator

2437MHz

Rate [Mbps]	Reading [dBm]	Remark
1	1.45	
2	1.14	
5.5	1.09	
11	1.57	*

*: Worst Rate

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

*Compared to the original test report: 29IE0204-HO-01-Ao, difference in Maximum Peak Output Power is within +/- 0.5dB.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 30JE0235-HO-01
Date 06/01/2010 06/01/2010
Temperature/ Humidity 25 deg.C./ 45% 24 deg.C./ 49%
Engineer Tomohisa Nakagawa Takumi Shimada
(Below 1GHz) (Above 1GHz)
Mode 11b Tx 2412MHz

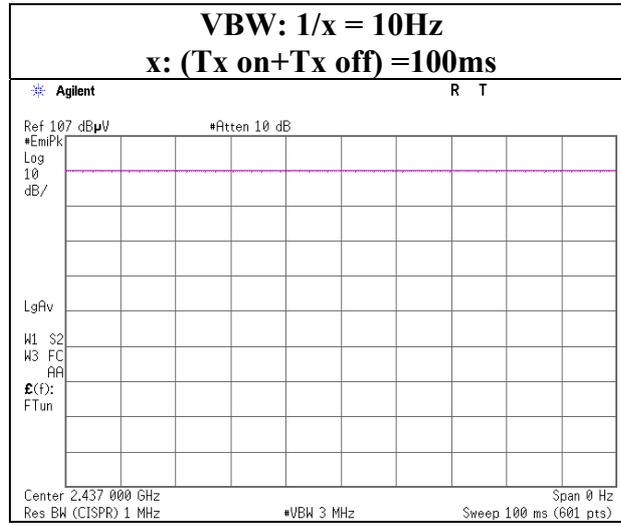
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	60.150	QP	33.1	8.3	7.1	28.6	19.9	40.0	20.1	
Hori	98.404	QP	46.3	10.3	7.4	28.5	35.5	43.5	8.0	
Hori	125.018	QP	41.3	14.0	7.6	28.4	34.5	43.5	9.0	
Hori	500.680	QP	32.4	18.2	9.8	28.8	31.6	46.0	14.4	
Hori	767.392	QP	32.4	21.4	10.8	28.4	36.2	46.0	9.8	
Hori	902.820	QP	31.8	21.8	11.2	28.0	36.8	46.0	9.2	
Hori	2252.430	PK	50.6	27.0	2.7	32.4	47.9	73.9	26.0	
Hori	2390.000	PK	52.1	27.1	2.7	32.4	49.5	73.9	24.4	
Hori	2400.000	PK	57.9	27.1	2.7	32.4	55.3	73.9	18.6	
Hori	4824.000	PK	40.3	30.5	5.1	31.3	44.6	73.9	29.4	
Hori	7236.000	PK	40.8	35.1	5.8	31.1	50.6	73.9	23.3	
Hori	9648.000	PK	42.0	37.7	6.6	31.4	54.9	73.9	19.0	
Hori	24120.000	PK	43.8	39.8	-1.3	29.1	53.2	73.9	20.7	
Hori	2252.430	AV	42.1	27.0	2.7	32.4	39.4	53.9	14.5	
Hori	2390.000	AV	42.1	27.1	2.7	32.4	39.5	53.9	14.4	
Hori	2400.000	AV	48.3	27.1	2.7	32.4	45.7	53.9	8.2	
Hori	4824.000	AV	28.5	30.5	5.1	31.3	32.8	53.9	21.2	
Hori	7236.000	AV	30.3	35.1	5.8	31.1	40.1	53.9	13.8	
Hori	9648.000	AV	30.2	37.7	6.6	31.4	43.1	53.9	10.8	
Hori	24120.000	AV	32.1	39.8	-1.3	29.1	41.5	53.9	12.4	
Vert	60.150	QP	50.2	8.3	7.1	28.6	37.0	40.0	3.0	
Vert	98.404	QP	46.7	10.3	7.4	28.5	35.9	43.5	7.6	
Vert	125.018	QP	45.4	14.0	7.6	28.4	38.6	43.5	4.9	
Vert	500.680	QP	33.5	18.2	9.8	28.8	32.7	46.0	13.3	
Vert	767.392	QP	30.2	21.4	10.8	28.4	34.0	46.0	12.0	
Vert	902.820	QP	31.9	21.8	11.2	28.0	36.9	46.0	9.1	
Vert	2253.330	PK	47.2	27.0	2.7	32.4	44.5	73.9	29.5	
Vert	2390.000	PK	55.6	27.1	2.7	32.4	53.0	73.9	20.9	
Vert	2400.000	PK	60.4	27.1	2.7	32.4	57.8	73.9	16.1	
Vert	4824.000	PK	39.6	30.5	5.1	31.3	43.9	73.9	30.0	
Vert	7236.000	PK	41.3	35.1	5.8	31.1	51.1	73.9	22.8	
Vert	9648.000	PK	41.4	37.7	6.6	31.4	54.3	73.9	19.6	
Vert	24120.000	PK	44.2	39.8	-1.3	29.1	53.6	73.9	20.3	
Vert	2253.330	AV	36.9	27.0	2.7	32.4	34.2	53.9	19.7	
Vert	2390.000	AV	44.4	27.1	2.7	32.4	41.8	53.9	12.1	
Vert	2400.000	AV	49.5	27.1	2.7	32.4	46.9	53.9	7.0	
Vert	4824.000	AV	28.3	30.5	5.1	31.3	32.6	53.9	21.3	
Vert	7236.000	AV	30.1	35.1	5.8	31.1	39.9	53.9	14.0	
Vert	9648.000	AV	31.2	37.7	6.6	31.4	44.1	53.9	9.8	
Vert	24120.000	AV	32.1	39.8	-1.3	29.1	41.5	53.9	12.4	

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).

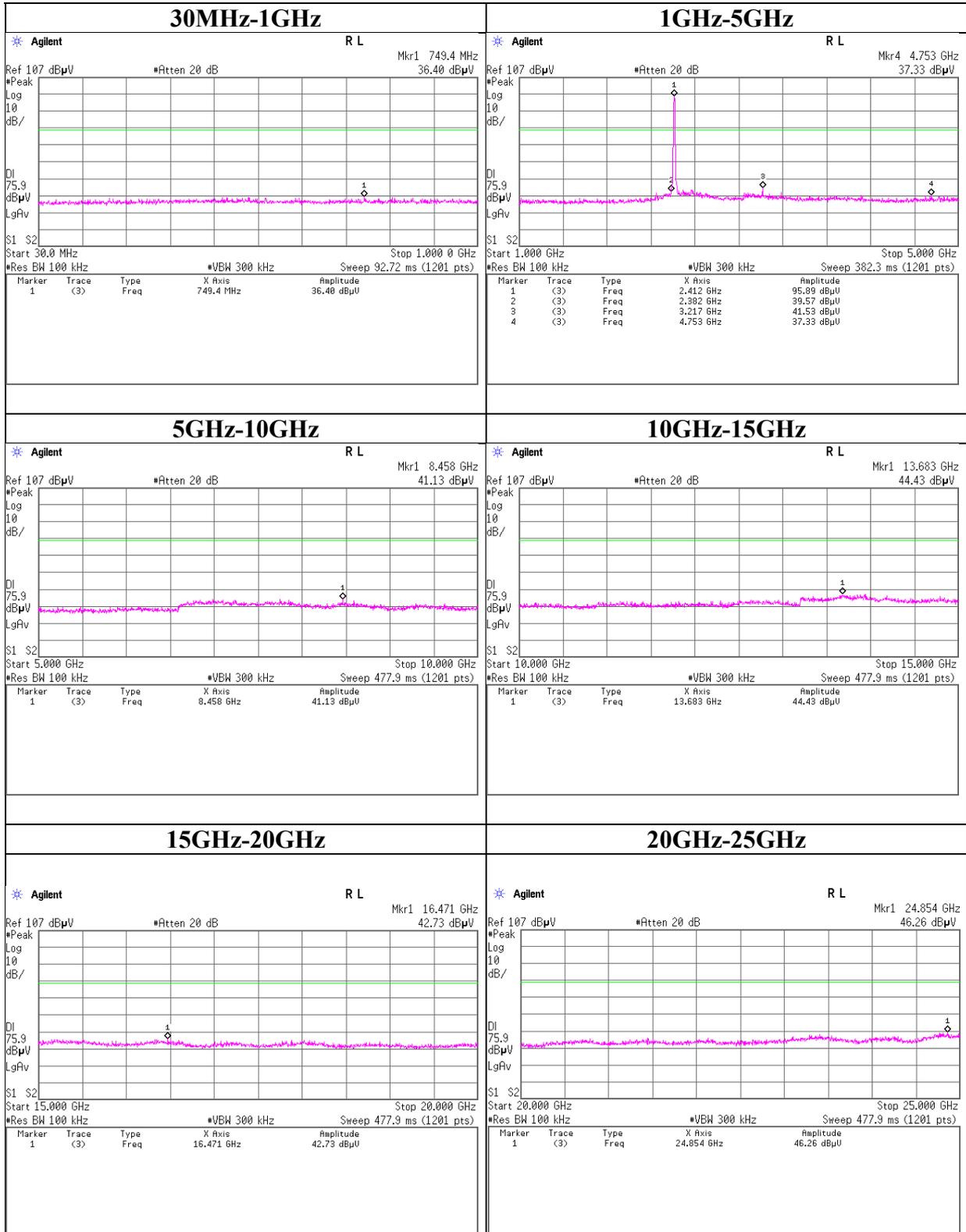
*The 10th harmonic was not seen so the result was its base noise level.
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

VBW (AV) Calculation



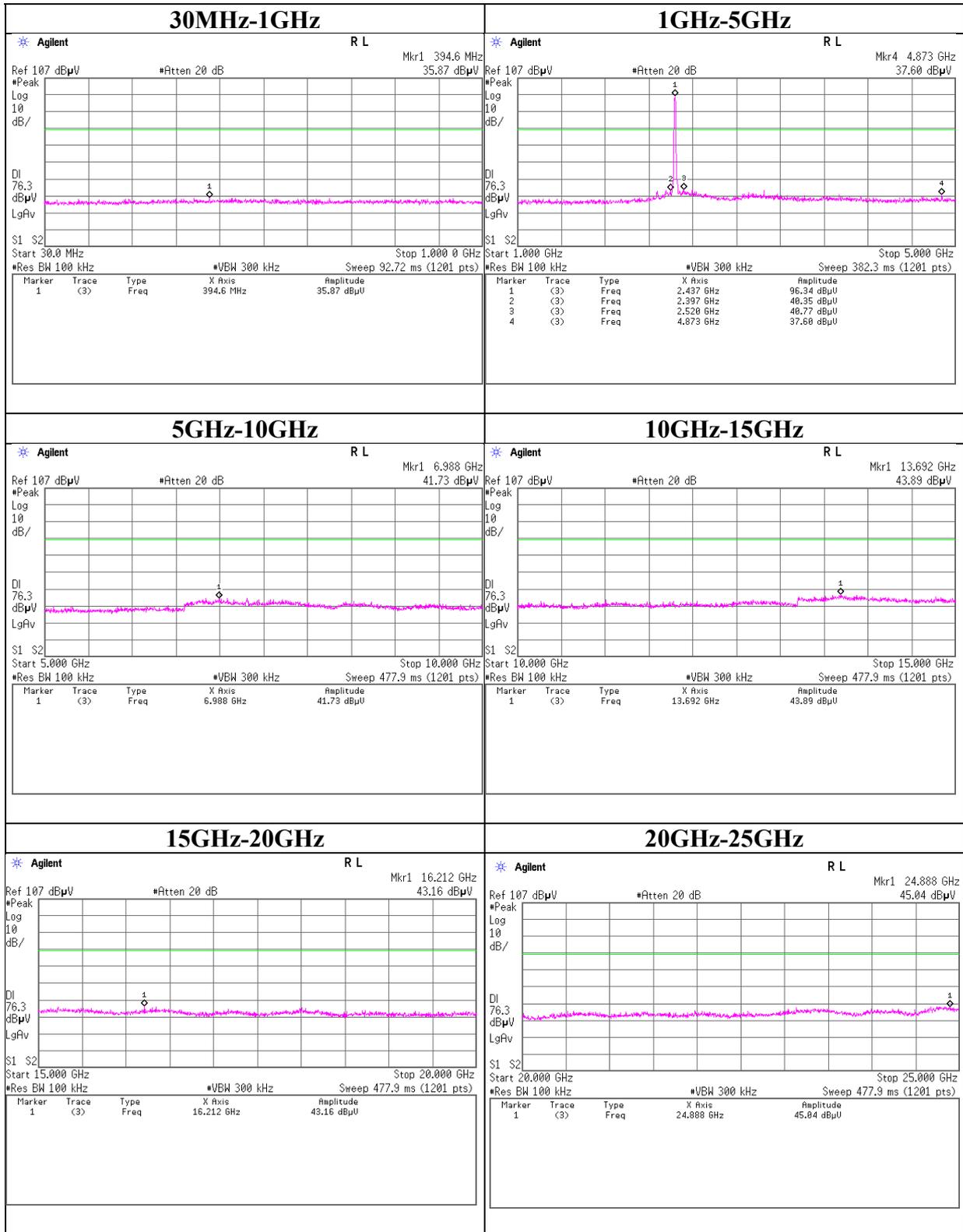
Conducted Spurious Emission

11b Tx 2412MHz



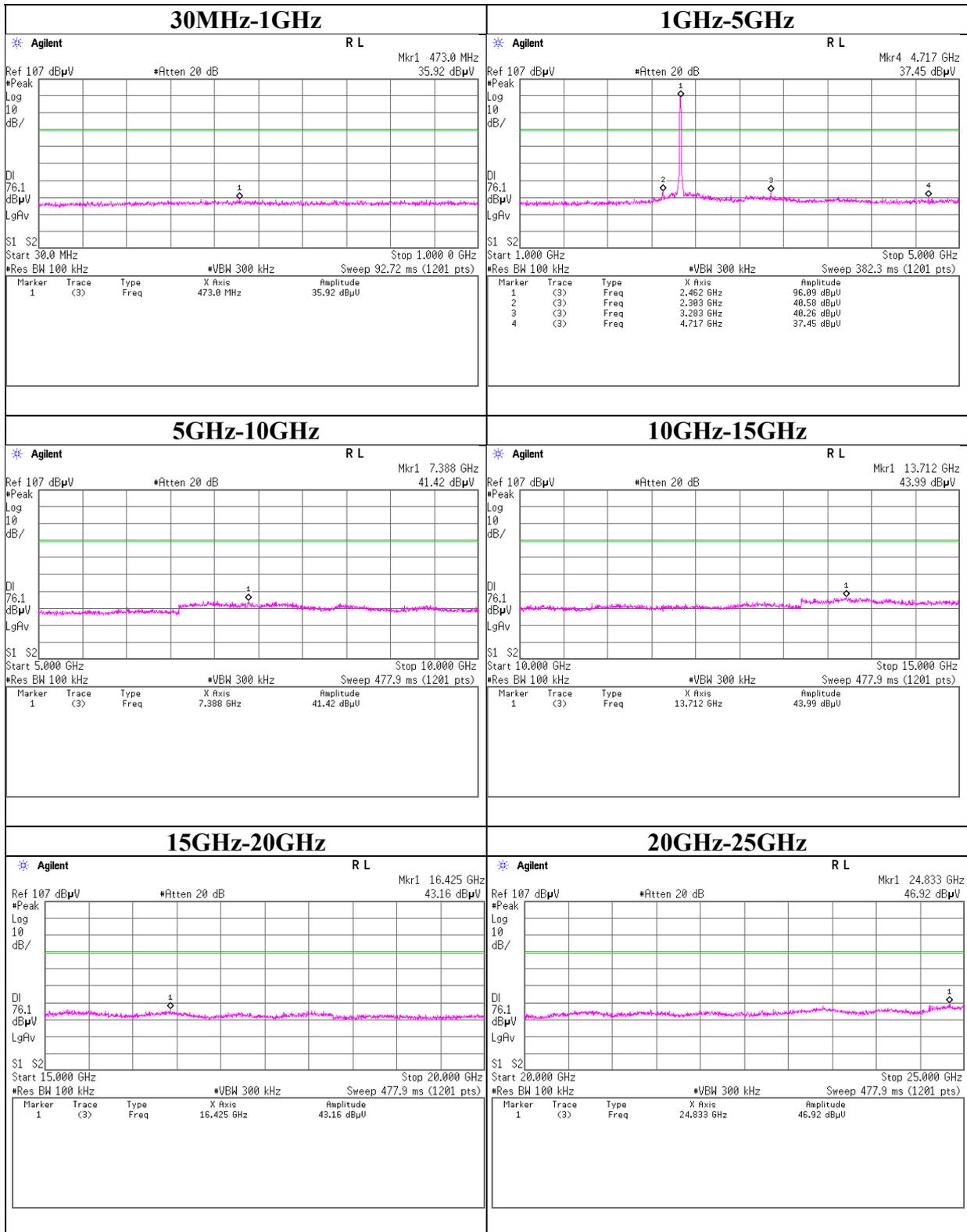
Conducted Spurious Emission

11b Tx 2437MHz



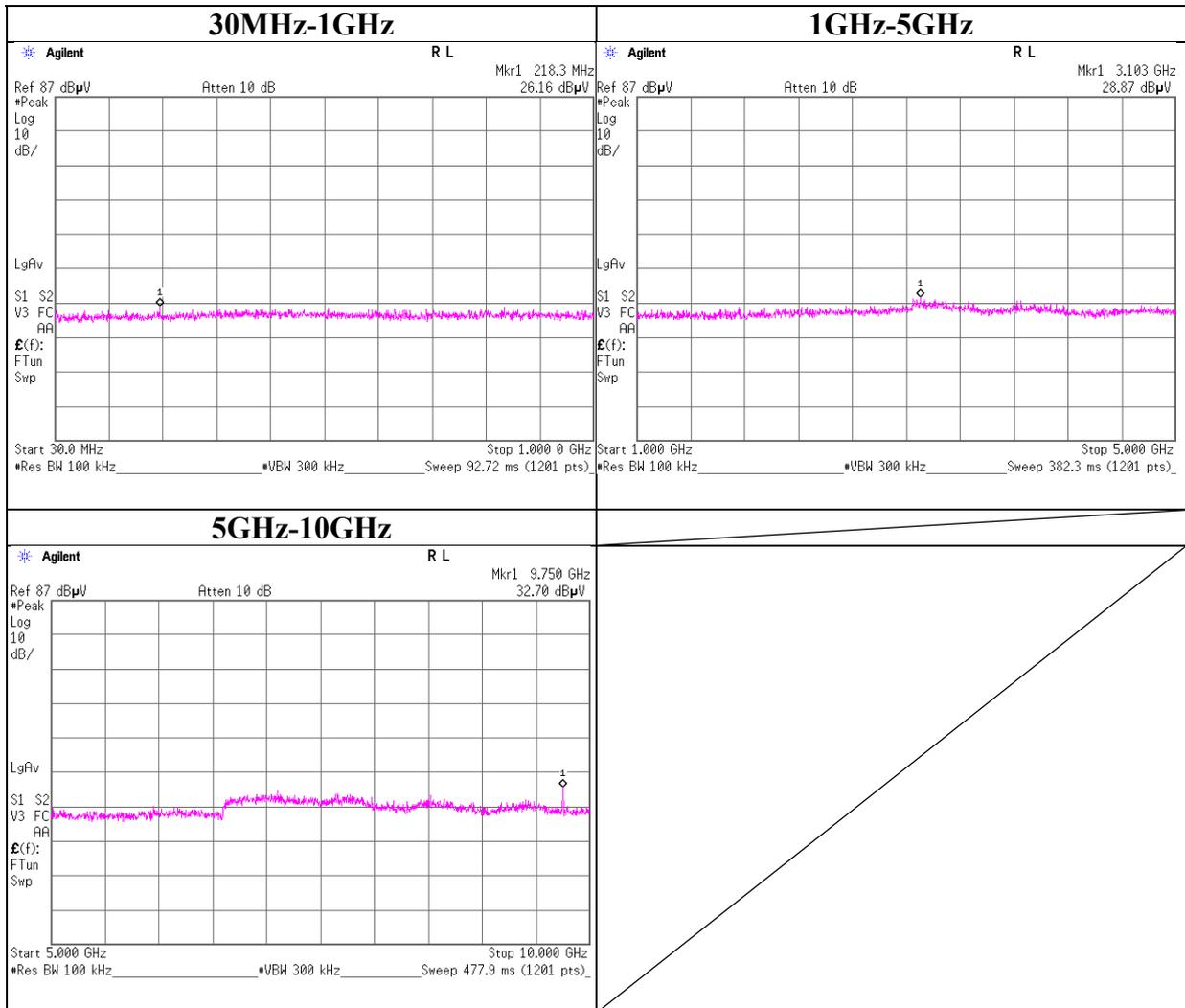
Conducted Spurious Emission

11b Tx 2462MHz



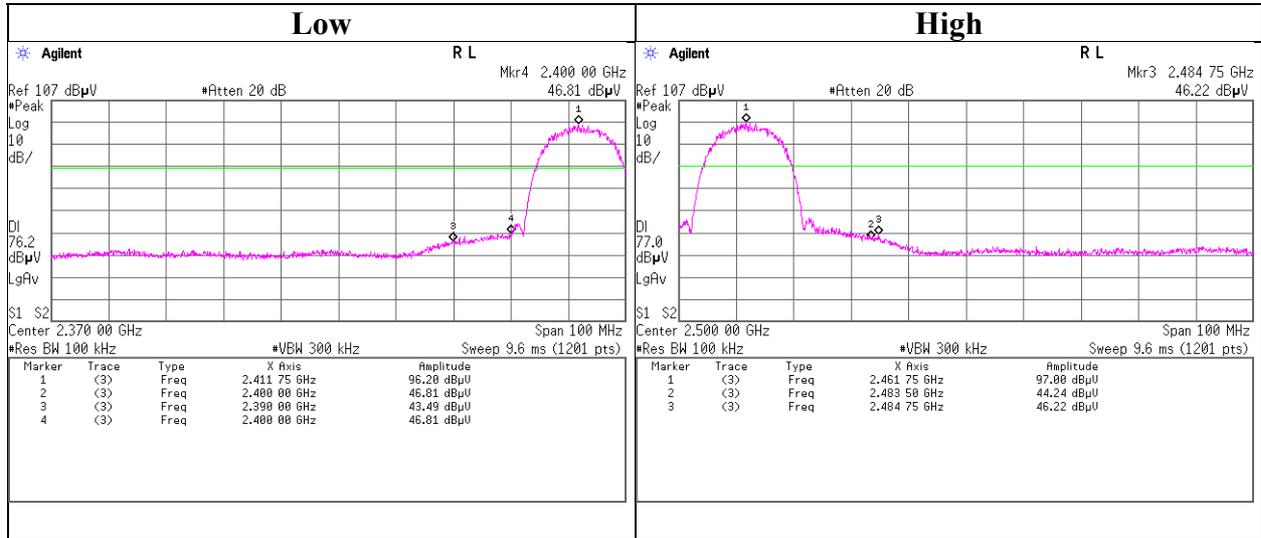
Conducted Spurious Emission

11b Rx 2437MHz



Conducted Emission Band Edge compliance

11b Tx

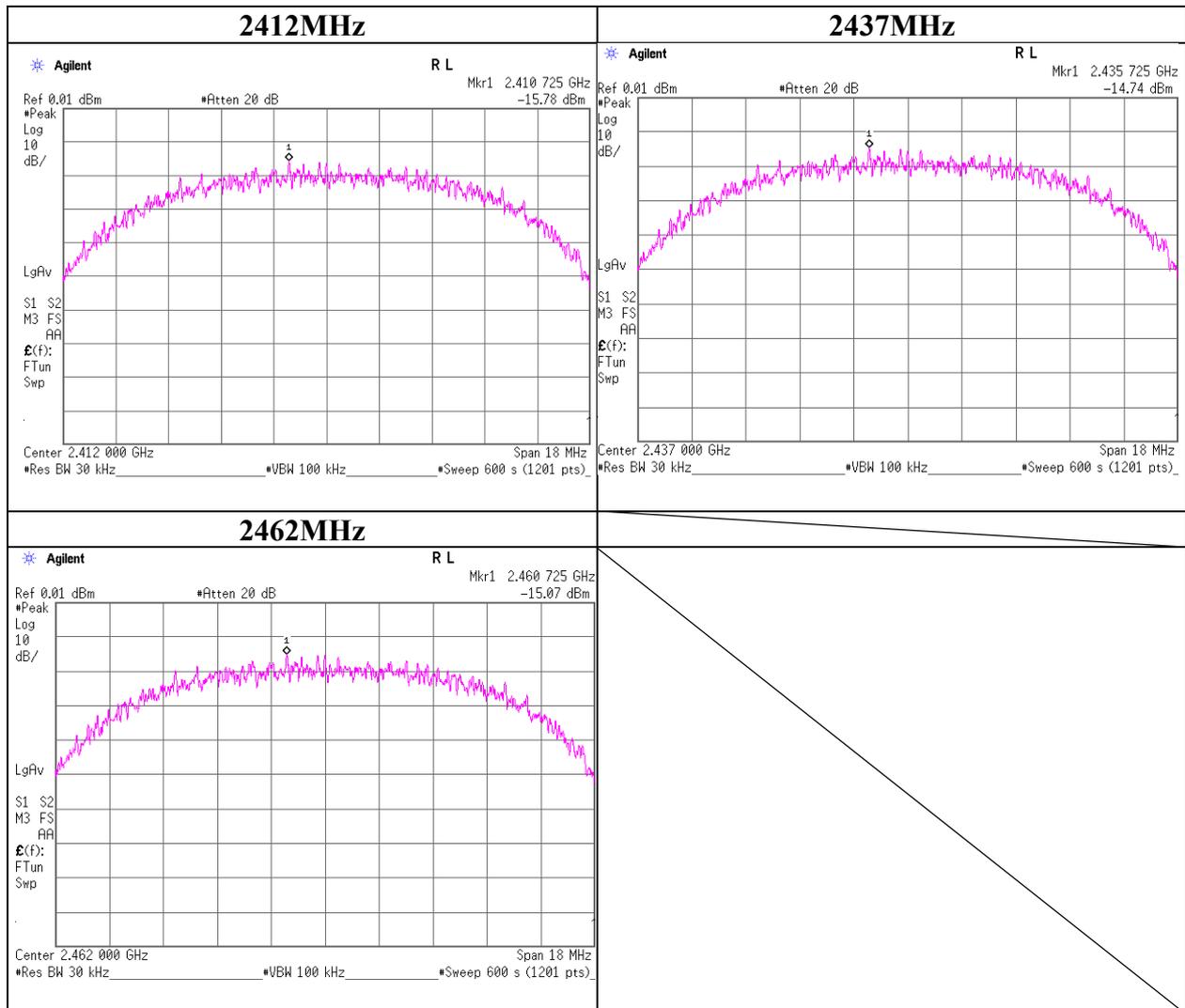


Power Density

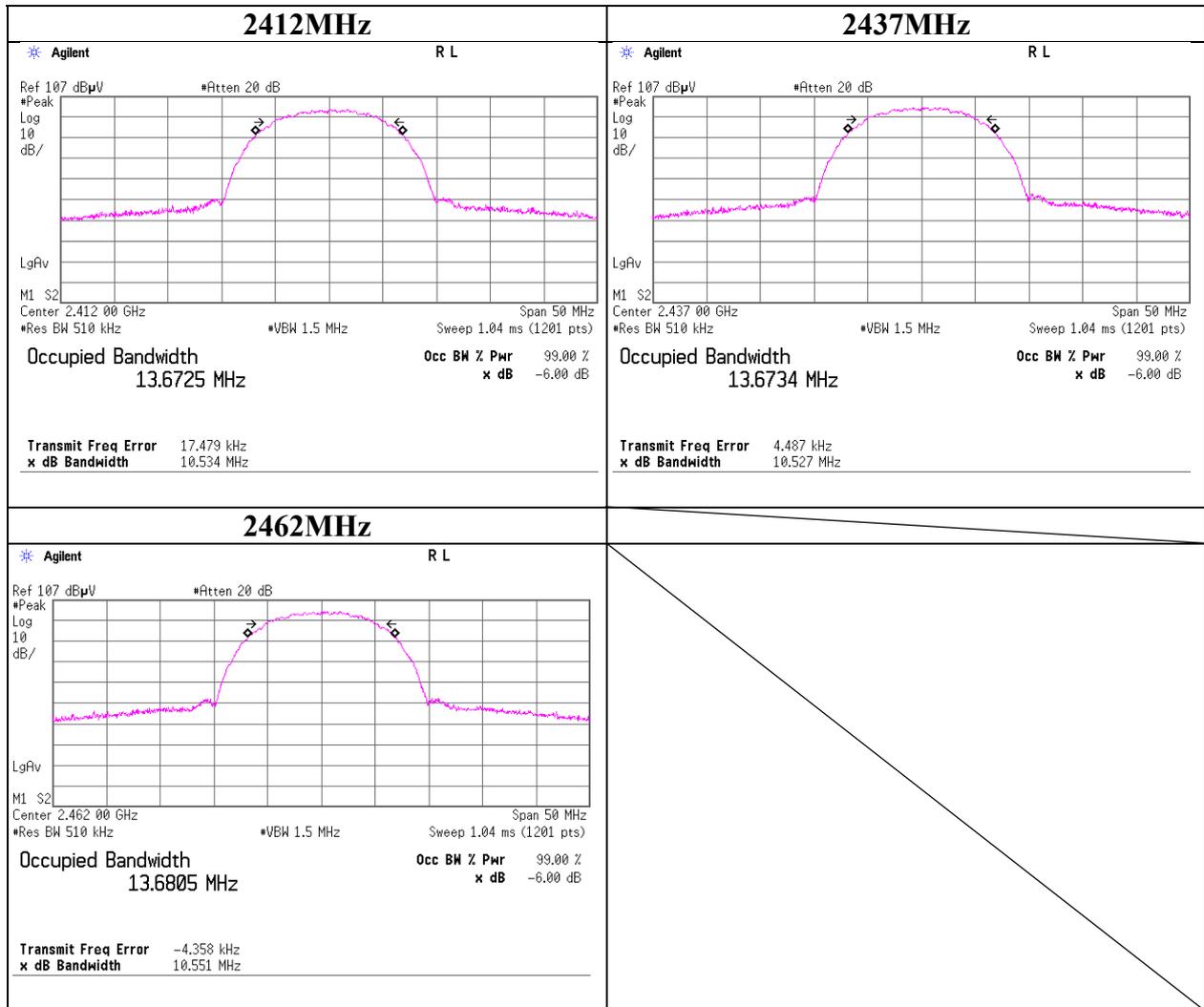
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	30JE0235-HO-01
Date	06/01/2010
Temperature/ Humidity	25 deg.C./ 50%
Engineer	Hiroshi Kukita
Mode	11b,Tx(Ch L,M,H),11Mbps

[IEEE802.11b]

Freq.	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2410.73	-15.78	1.10	10.00	-4.68	8.00	12.68
2435.73	-14.74	1.10	10.00	-3.64	8.00	11.64
2460.73	-15.07	1.10	10.00	-3.97	8.00	11.97



99%Occupied Bandwidth



APPENDIX 3: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2009/09/09 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2009/09/09 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2010/03/01 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2010/05/19 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2010/02/03 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE/CE	2009/08/17 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE/CE	2010/02/09 * 12
MJM-05	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE/CE	2009/11/20 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2010/01/19 * 12
MCC-47	Microwave Cable	Suhner	SUCOFLEX104	295123(5m) / 287573(1m)	RE	2009/11/19 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2009/09/14 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2010/01/19 * 12
MCC-77	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278942/4	RE	2009/12/19 * 12
MHF-18	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	7002	RE	2009/12/19 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	CE	2010/04/19 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2010/02/04 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE(AE)	2010/02/05 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2010/01/20 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2010/02/22 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2010/02/04 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA9103200 8	RE	2009/10/05 * 12
KLA-04	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2009/10/05 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2010/02/22 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2009/11/12 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2009/09/02 * 12

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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**