

**APPENDIX 2: Data of EMI test**

**Conducted Emission**

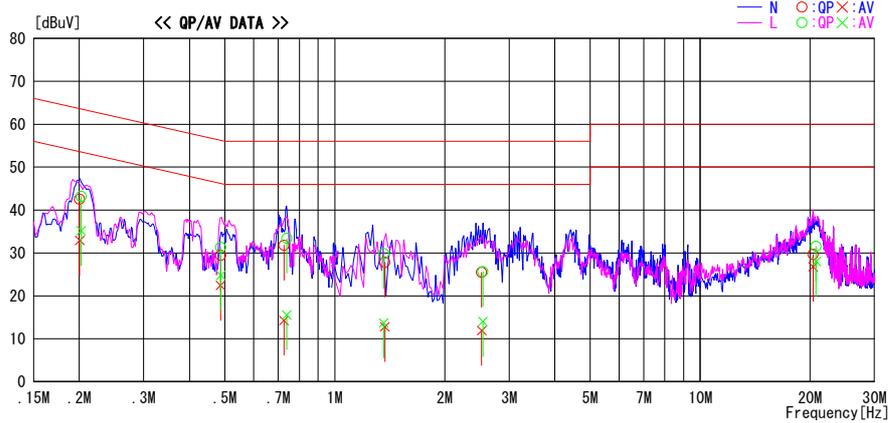
**DATA OF CONDUCTED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2011/04/12

Report No. : 311E0068-HO-01  
Temp./Humi. : 21deg. C / 35%RH  
Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 11b 2412MHz 11Mbps

LIMIT : FCC15.207 QP  
FCC15.207 AV

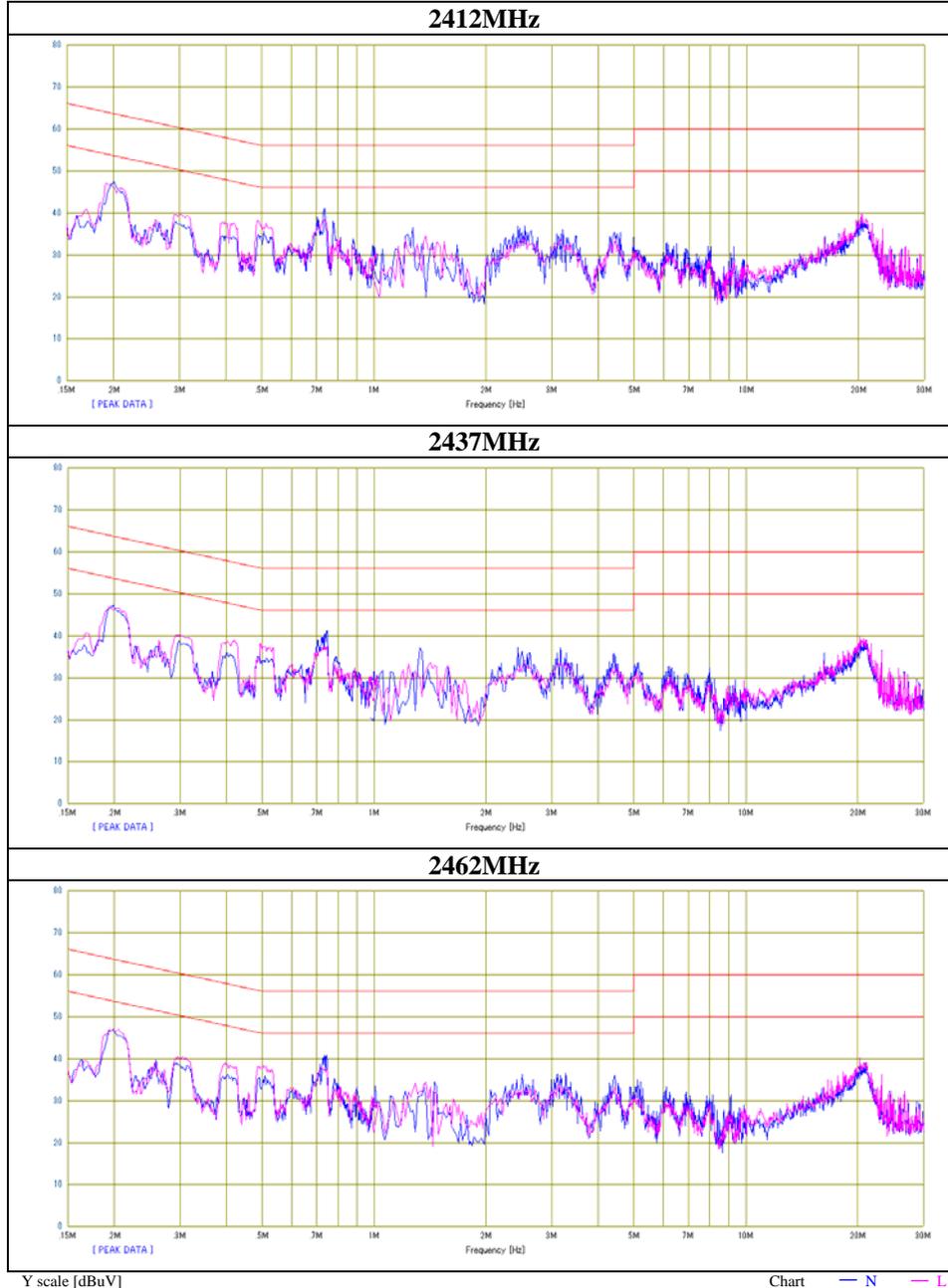


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.20026	29.4	19.8	13.1	42.5	32.9	63.6	53.6	21.1	20.7	N	
0.48708	16.3	9.3	13.1	29.4	22.4	56.2	46.2	26.8	23.8	N	
0.72588	18.6	1.1	13.2	31.8	14.3	56.0	46.0	24.2	31.7	N	
1.37063	14.5	-0.5	13.3	27.8	12.8	56.0	46.0	28.2	33.2	N	
2.52314	12.1	-1.5	13.4	25.5	11.9	56.0	46.0	30.5	34.1	N	
20.36570	15.5	12.6	14.2	29.7	26.8	60.0	50.0	30.3	23.2	N	
0.20241	30.1	22.1	13.1	43.2	35.2	63.5	53.5	20.3	18.3	L	
0.48752	18.2	11.7	13.1	31.3	24.8	56.2	46.2	24.9	21.4	L	
0.73930	20.2	2.4	13.2	33.4	15.6	56.0	46.0	22.6	30.4	L	
1.36156	16.5	0.4	13.3	29.8	13.7	56.0	46.0	26.2	32.3	L	
2.54173	12.2	0.6	13.4	25.6	14.0	56.0	46.0	30.4	32.0	L	
20.75340	17.3	13.8	14.2	31.5	28.0	60.0	50.0	28.5	22.0	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F (LISN LOSS+CABLE LOSS+ATTEN. 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.	31IE0068-HO-01
Date	04/12/2011
Temperature/ Humidity	21 deg.C/ 35% RH
Engineer	Satofumi Matsuyama
Mode	11b Tx



### 6dB Bandwidth

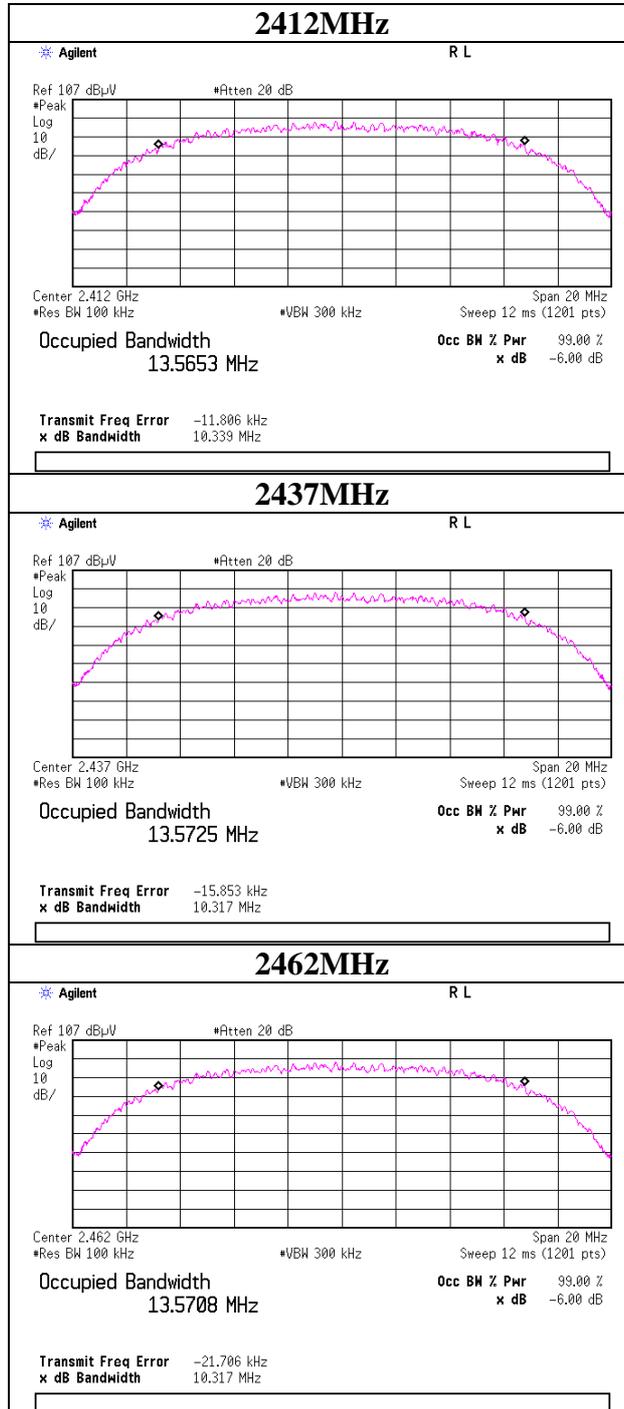
Test place Head Office EMC Lab. No.6 Measurement Room  
Report No. 31IE0068-HO-01  
Date 04/11/2011  
Temperature/ Humidity 22 deg.C / 43 % RH  
Engineer Takumi Shimada  
Mode 11b Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	10.339	>500
2437	10.317	>500
2462	10.317	>500

## 6dB Bandwidth

**11b**





## Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 31IE0068-HO-01  
Date : 04/12/2011 04/12/2011  
Temperature/ Humidity : 21 deg.C/ 35% RH 21 deg.C/ 35% RH  
Engineer : Satofumi Matsuyama Katsunori Okai  
(Above 1GHz) (Below 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	60.216	QP	33.5	8.4	7.4	32.2	17.1	40.0	22.9	
Hori	98.462	QP	46.4	10.0	8.0	32.2	32.2	43.5	11.3	
Hori	143.263	QP	38.4	14.7	8.5	32.1	29.5	43.5	14.0	
Hori	431.995	QP	41.9	18.1	10.6	32.1	38.5	46.0	7.5	
Hori	625.084	QP	34.0	20.6	11.7	32.2	34.1	46.0	11.9	
Hori	902.381	QP	33.4	24.2	13.0	31.3	39.3	46.0	6.7	
Hori	1624.297	PK	44.1	26.2	2.1	33.1	39.3	73.9	34.6	
Hori	2390.000	PK	47.6	27.2	2.5	32.2	45.1	73.9	28.8	
Hori	2398.583	PK	56.3	27.2	2.5	32.2	53.8	73.9	20.1	
Hori	2400.000	PK	54.8	27.2	2.5	32.2	52.3	73.9	21.6	
Hori	3217.000	PK	42.1	28.6	2.9	31.9	41.7	73.9	32.2	NS
Hori	4824.000	PK	47.6	30.9	5.2	31.4	52.3	73.9	21.6	
Hori	7236.000	PK	44.0	35.7	6.2	32.4	53.5	73.9	20.4	NS
Hori	9648.000	PK	44.8	37.8	7.0	33.2	56.4	73.9	17.5	
Hori	24120.000	PK	46.7	37.9	-0.9	31.6	52.1	73.9	21.8	NS
Hori	1624.297	AV	31.9	26.2	2.1	33.1	27.1	53.9	26.8	
Hori	2390.000	AV	34.7	27.2	2.5	32.2	32.2	53.9	21.7	
Hori	2398.583	AV	46.5	27.2	2.5	32.2	44.0	53.9	9.9	
Hori	2400.000	AV	44.7	27.2	2.5	32.2	42.2	53.9	11.7	
Hori	3217.000	AV	29.7	28.6	2.9	31.9	29.3	53.9	24.6	NS
Hori	4824.000	AV	35.2	30.9	5.2	31.4	39.9	53.9	14.0	
Hori	7236.000	AV	31.9	35.7	6.2	32.4	41.4	53.9	12.5	NS
Hori	9648.000	AV	33.0	37.8	7.0	33.2	44.6	53.9	9.3	
Hori	24120.000	AV	35.2	37.9	-0.9	31.6	40.6	53.9	13.3	NS
Vert	60.208	QP	49.7	8.4	7.4	32.2	33.3	40.0	6.7	
Vert	94.381	QP	51.4	9.3	7.9	32.2	36.4	43.5	7.1	
Vert	143.263	QP	41.7	14.7	8.5	32.1	32.8	43.5	10.7	
Vert	431.995	QP	40.2	18.1	10.6	32.1	36.8	46.0	9.2	
Vert	625.081	QP	30.1	20.6	11.7	32.2	30.2	46.0	15.8	
Vert	902.383	QP	29.1	24.2	13.0	31.3	35.0	46.0	11.0	
Vert	1624.273	PK	45.5	26.2	2.1	33.1	40.7	73.9	33.2	
Vert	2390.000	PK	45.6	27.2	2.5	32.2	43.1	73.9	30.8	
Vert	2398.587	PK	55.9	27.2	2.5	32.2	53.4	73.9	20.5	
Vert	2400.000	PK	55.4	27.2	2.5	32.2	52.9	73.9	21.0	
Vert	3217.000	PK	41.7	28.6	2.9	31.9	41.3	73.9	32.6	NS
Vert	4824.000	PK	44.7	30.9	5.2	31.4	49.4	73.9	24.5	
Vert	7236.000	PK	42.9	35.7	6.2	32.4	52.4	73.9	21.5	NS
Vert	9648.000	PK	42.8	37.8	7.0	33.2	54.4	73.9	19.5	
Vert	24120.000	PK	47.8	37.9	-0.9	31.6	53.2	73.9	20.7	NS
Vert	1624.273	AV	35.5	26.2	2.1	33.1	30.7	53.9	23.2	
Vert	2390.000	AV	33.7	27.2	2.5	32.2	31.2	53.9	22.7	
Vert	2398.587	AV	46.6	27.2	2.5	32.2	44.1	53.9	9.8	
Vert	2400.000	AV	44.7	27.2	2.5	32.2	42.2	53.9	11.7	
Vert	3217.000	AV	29.7	28.6	2.9	31.9	29.3	53.9	24.6	NS
Vert	4824.000	AV	33.7	30.9	5.2	31.4	38.4	53.9	15.5	
Vert	7236.000	AV	32.0	35.7	6.2	32.4	41.5	53.9	12.4	NS
Vert	9648.000	AV	30.5	37.8	7.0	33.2	42.1	53.9	11.8	
Vert	24120.000	AV	35.2	37.9	-0.9	31.6	40.6	53.9	13.3	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.

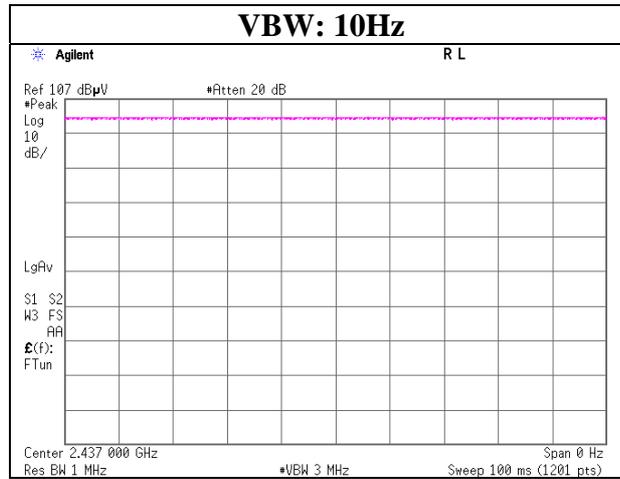
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

NS=No Signal



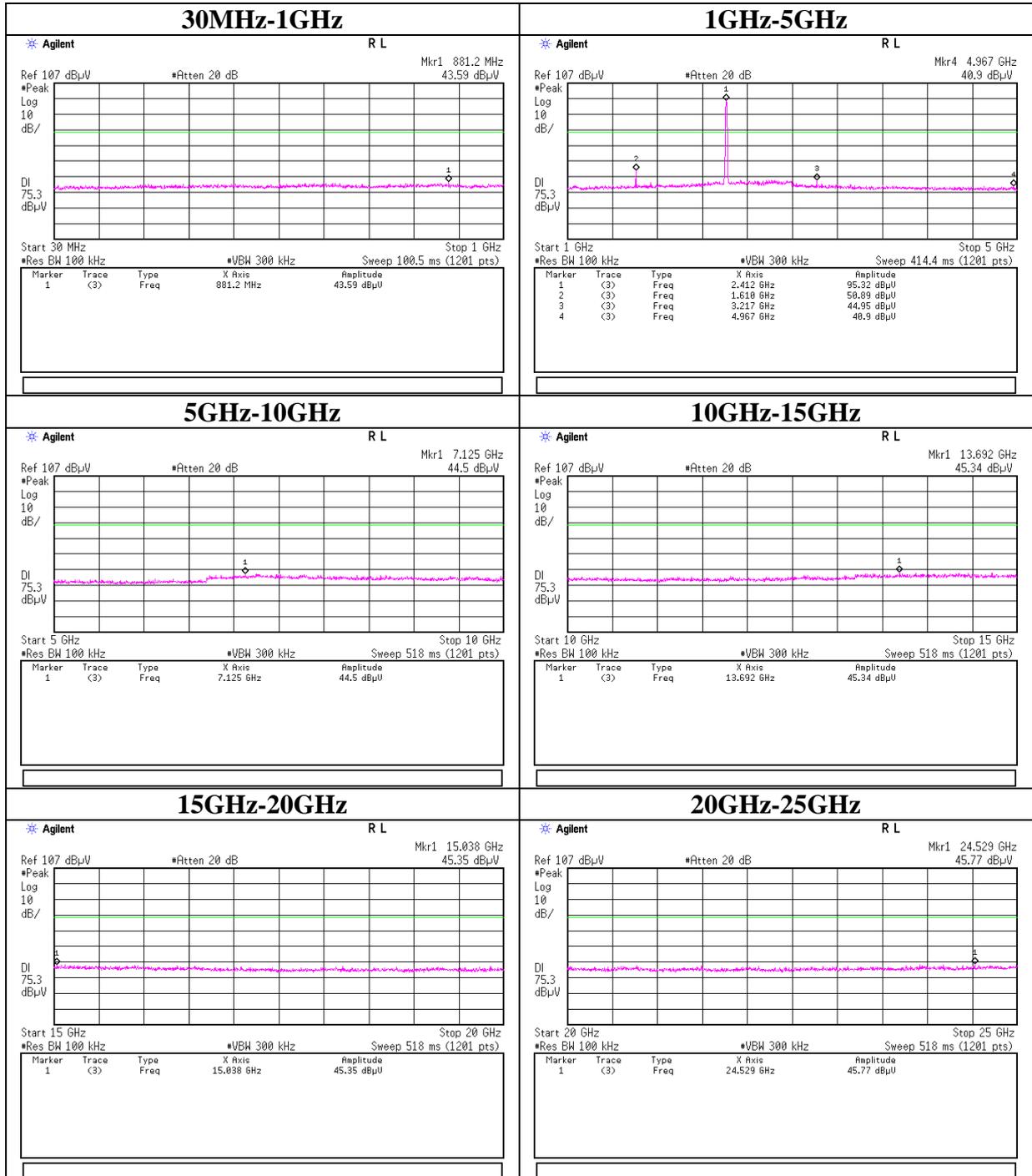


### VBW (AV) Calculation



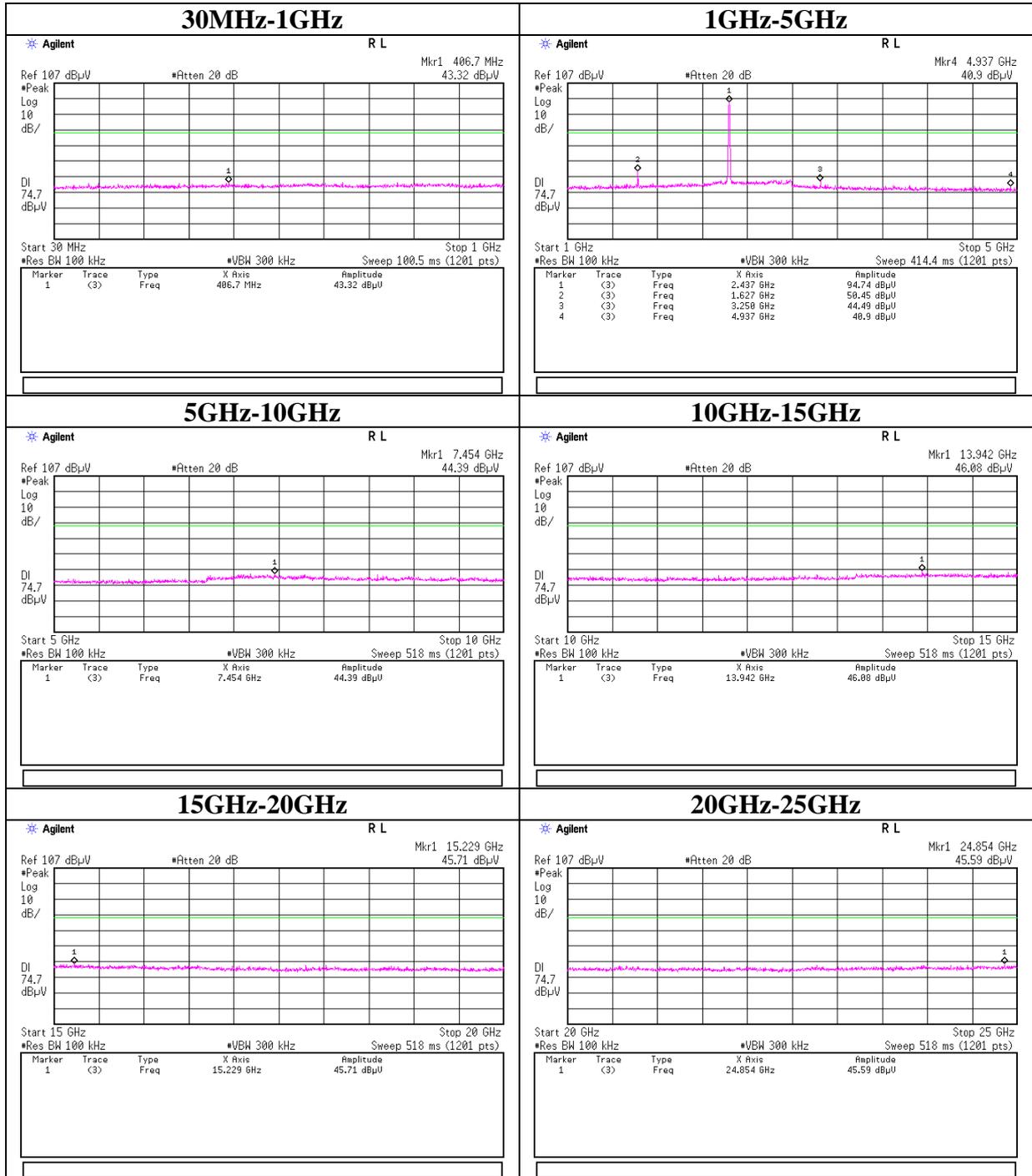
## Conducted Spurious Emission

### 11b Tx 2412MHz



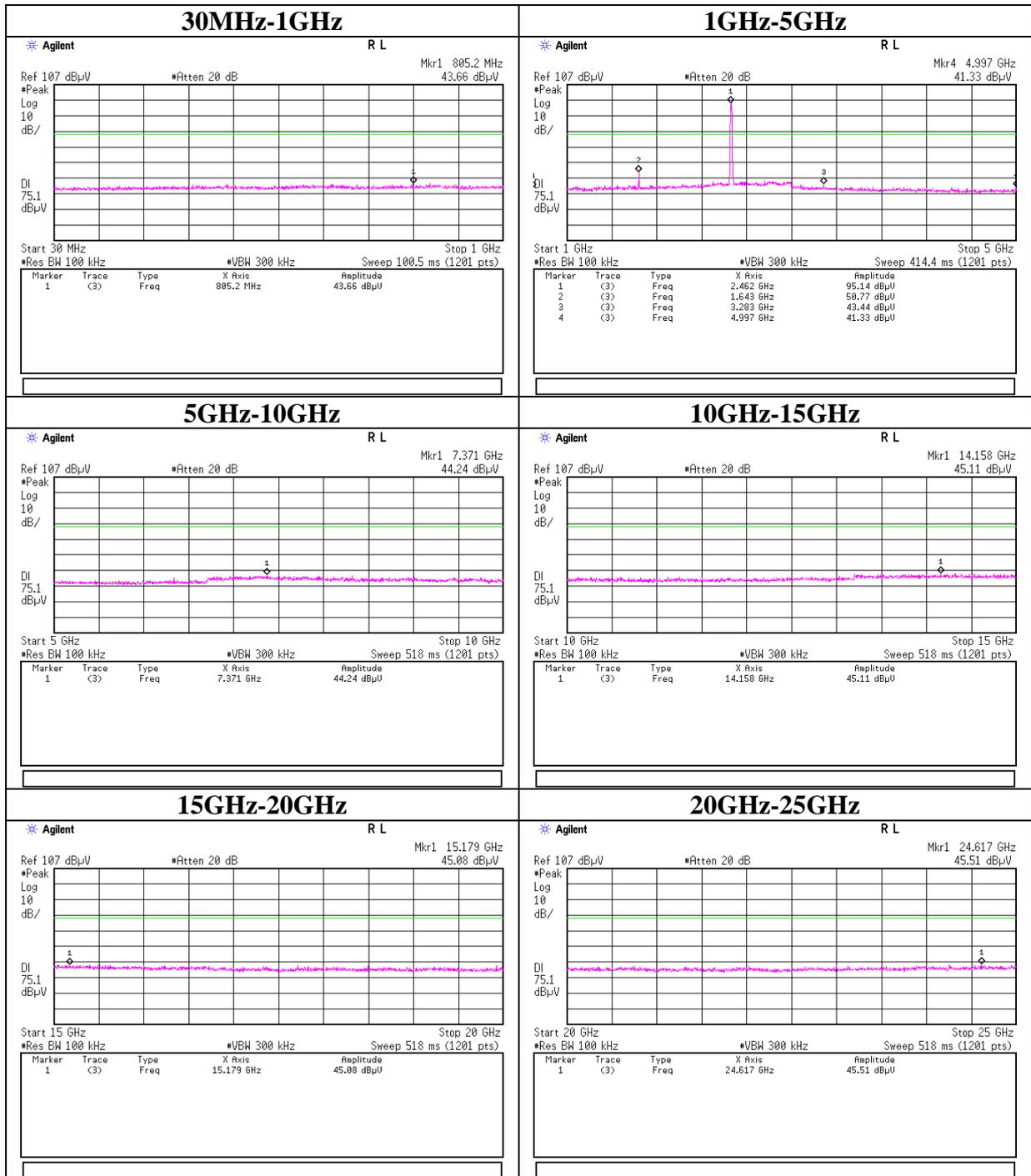
## Conducted Spurious Emission

### 11b Tx 2437MHz



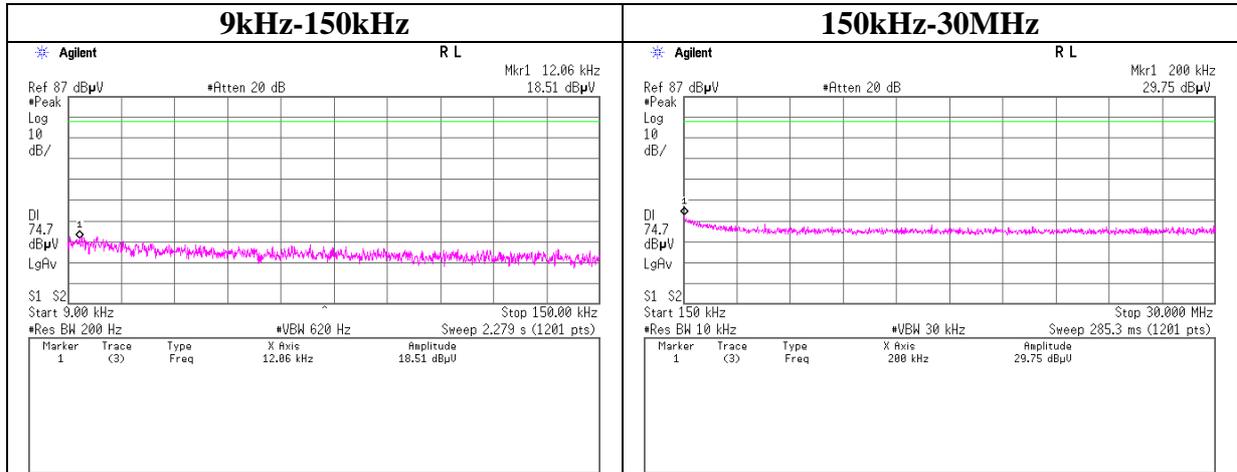
## Conducted Spurious Emission

### 11b Tx 2462MHz



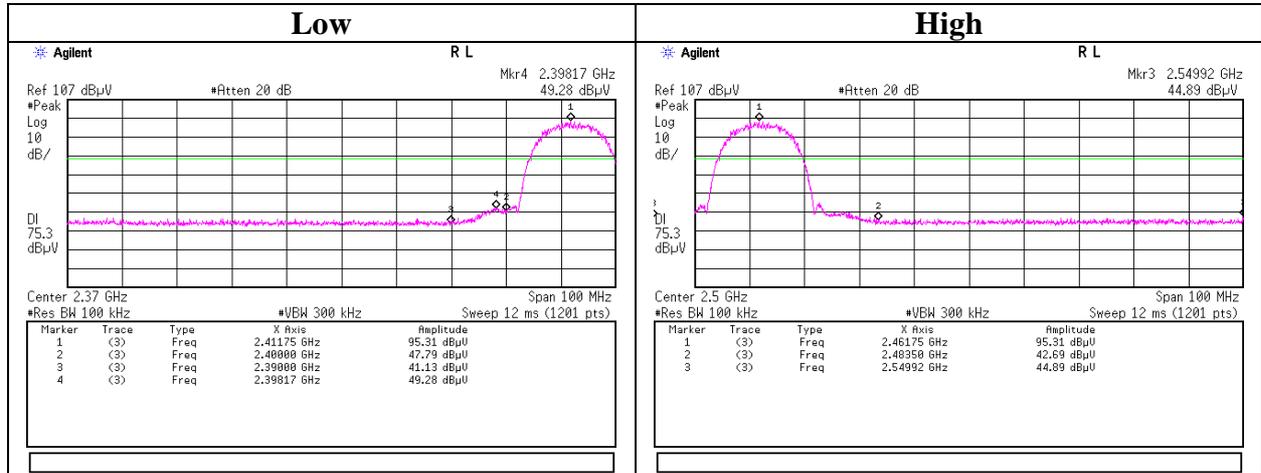
**Conducted Spurious Emission(below 30MHz)**

**11b Tx 2437MHz**



**Conducted Emission Band Edge compliance**

**11b Tx**



### Power Density

Test place                      Head Office EMC Lab. No.6 Measurement Room  
Report No.                      31IE0068-HO-01  
Date                              04/11/2011  
Temperature/ Humidity        22 deg.C / 43 % RH  
Engineer                        Takumi Shimada  
Mode                              11b Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-16.13	0.50	9.97	-5.66	8.00	13.66
2437.00	-16.22	0.50	9.97	-5.75	8.00	13.75
2462.00	-16.19	0.50	9.97	-5.72	8.00	13.72

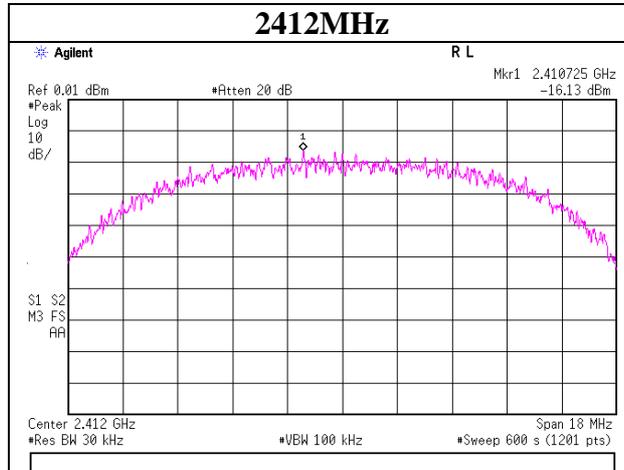
Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

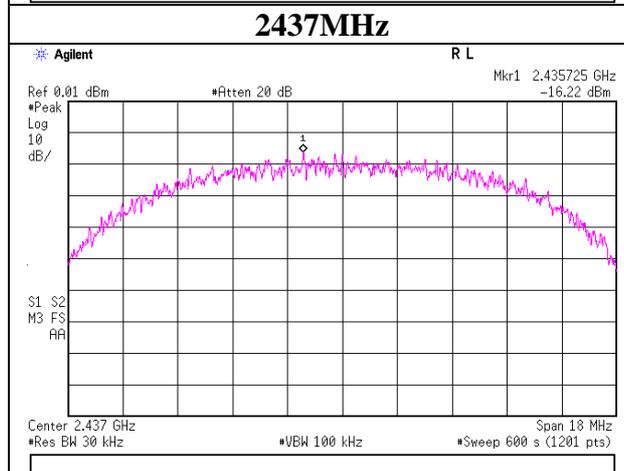
## Power Density

11b

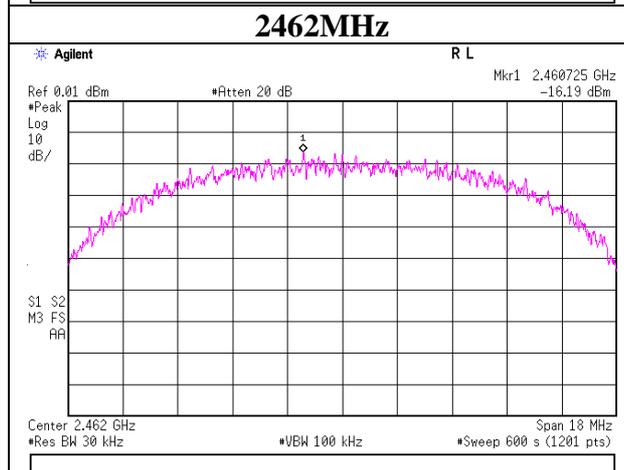
2412MHz



2437MHz

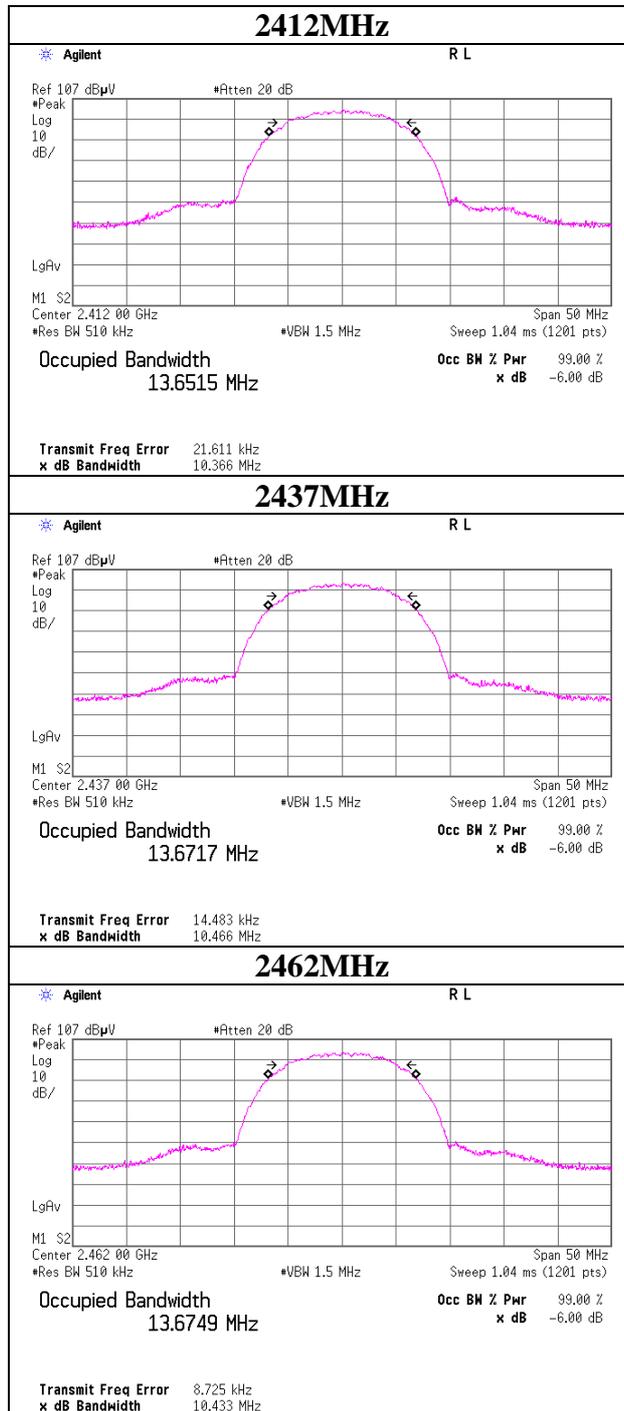


2462MHz



**99%Occupied Bandwidth**

**11b**



### APPENDIX 3: Test instruments

#### EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-06	Spectrum Analyzer	Agilent	E4407B	MY45107638	AT	2010/04/07 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	AT/RE	2010/11/30 * 12
MAT-24	Attenuator(10dB)(above1GHz)	Agilent	8493C	71389	AT	2010/06/14 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2010/11/01 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2010/11/01 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2011/02/23 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	CE	2010/09/01 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	CE	2011/02/23 * 12
MJM-05	Measure	PROMART	SEN1955	-	CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	CE	2010/04/19 * 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-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2011/02/18 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2011/02/21 * 12
MHF-20	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCC	607	RE	2010/09/21 * 12
MCC-79	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278923/4	RE	2010/12/02 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2011/03/01 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2011/02/23 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE	-
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2010/08/08 * 12
MCC-56	Microwave Cable	Suhner	SUCOFLEX104	270875/4(1m) / 284655(5m)	RE	2011/03/02 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2011/03/10 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA917030 7	RE	2010/06/29 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE	2010/11/18 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2010/10/27 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2010/10/11 * 12

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**EMI test equipment (2/2)**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2010/10/11 * 12
MCC-50	Coaxial cable	UL Japan	-	-	RE	2011/03/25 * 12
MAT-51	Attenuator(6dB)	Weinschel	2	AS3557	RE	2011/01/14 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2011/03/04 * 12

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

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

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

**Test Item: CE: Conducted Emission  
RE: Radiated Emission  
AT: Antenna Terminal Conducted test**