APPENDIX 2: Data of EMI test

Radiated Emission below 30MHz (Fundamental and Spurious Emission)
Antenna A

DATA OF RADIATED EMISSION TEST

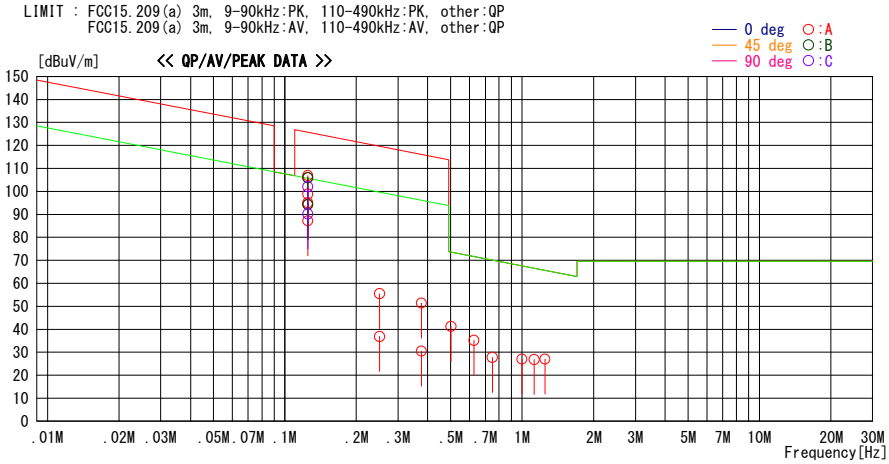
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2011/02/02

Report No. : 31BE0219-HO-04

Temp./ Humi. : 21deg. C. /31% RH
Engineer : Kazuya Yoshioka

Mode / Remarks : Tx 125kHz AntennaA Worst Axis(ECU:X-axis Antenna:X-axis)

LIMIT : FCC15.209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq. [MHz]	Reading [dBuV]	DET	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]		Table [deg]	Comment
0.12500	112.1	PEAK	20.1	5.9	32.1	106.0	125.7	19.7	45	B	335	
0.12500	108.1	PEAK	20.1	5.9	32.1	102.0	125.7	23.7	90	C	282	
0.12500	112.9	PEAK	20.1	5.9	32.1	106.8	125.7	18.9	0	A	359	Worst
0.12500	112.1	PEAK	20.1	5.9	32.1	106.0	125.7	19.7	135	A	28	
0.12500	100.4	AV	20.1	5.9	32.1	94.3	105.7	11.4	135	A	28	
0.12500	96.3	AV	20.1	5.9	32.1	90.2	105.7	15.5	90	C	282	
0.12500	100.3	AV	20.1	5.9	32.1	94.2	105.7	11.5	45	B	335	
0.12500	101.1	AV	20.1	5.9	32.1	95.0	105.7	10.7	0	A	359	Worst
0.12500	104.9	PEAK	20.1	5.9	32.1	98.8	125.7	26.9	0	A	359	Hori
0.12500	93.2	AV	20.1	5.9	32.1	87.1	105.7	18.6	0	A	359	Hori
0.25061	29.4	PEAK	20.0	6.0	0.0	55.4	119.6	64.2	0	A	359	
0.25061	10.8	AV	20.0	6.0	0.0	36.8	99.6	62.8	0	A	359	
0.37574	25.5	PEAK	19.9	6.0	0.0	51.4	116.1	64.7	0	A	359	
0.37574	4.6	AV	19.9	6.0	0.0	30.5	96.1	65.6	0	A	359	
0.50098	15.4	QP	19.9	6.0	0.0	41.3	73.6	32.3	0	A	359	
0.62619	9.3	QP	19.9	6.0	0.0	35.2	71.7	36.5	0	A	359	
0.75000	1.8	QP	19.9	6.0	0.0	27.7	70.1	42.4	0	A	358	
1.00000	1.1	QP	19.9	6.0	0.0	27.0	67.6	40.6	0	A	359	
1.12500	0.9	QP	19.9	6.1	0.0	26.9	66.5	39.6	0	A	357	
1.25000	1.0	QP	19.9	6.1	0.0	27.0	65.6	38.6	0	A	359	

CHART: WITH FACTOR , ANT TYPE: LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB](CABLE + ATTEN.- AMP.)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission above 30MHz (Spurious Emission)
Antenna A

DATA OF RADIATED EMISSION TEST

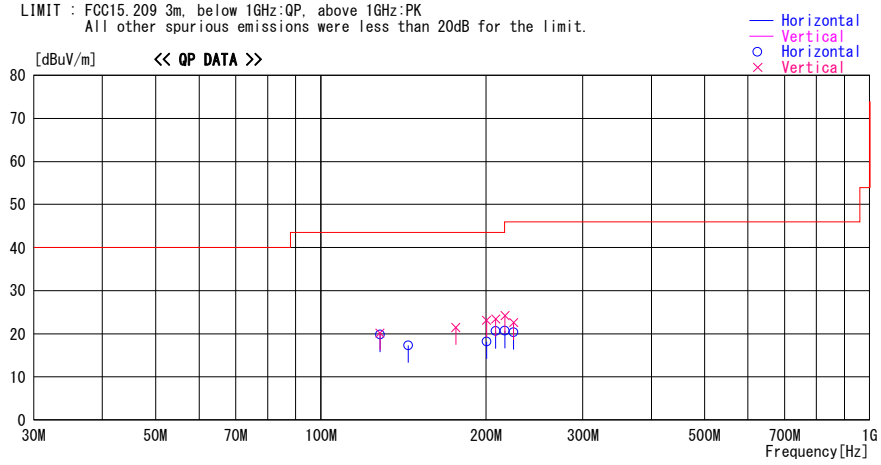
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2011/02/03

Report No. : 31BE0219-HO-04

Temp. / Humi. : 24deg.C / 34% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 125kAntenna A Worst Axis (ECU Hori: Y Vert: Y, Ant Hori: Z, Vert: Z)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
128.261	30.1	QP	13.7	-23.6	20.2	1	100	Vert.	43.5	23.3	
128.261	29.7	QP	13.7	-23.6	19.8	148	243	Hori.	43.5	23.7	
144.294	26.0	QP	14.8	-23.5	17.3	118	223	Hori.	43.5	26.2	
176.361	28.7	QP	16.0	-23.2	21.5	184	100	Vert.	43.5	22.0	
200.408	29.5	QP	16.7	-23.0	23.2	201	100	Vert.	43.5	20.3	
200.409	24.5	QP	16.7	-23.0	18.2	27	249	Hori.	43.5	25.3	
208.423	26.7	QP	16.8	-22.9	20.6	40	236	Hori.	43.5	22.9	
208.423	29.5	QP	16.8	-22.9	23.4	195	100	Vert.	43.5	20.1	
216.436	26.7	QP	16.9	-22.9	20.7	30	226	Hori.	46.0	25.3	
216.439	30.2	QP	16.9	-22.9	24.2	357	100	Vert.	46.0	21.8	
224.457	28.4	QP	17.0	-22.8	22.6	3	100	Vert.	46.0	23.4	
224.457	26.2	QP	17.0	-22.8	20.4	306	224	Hori.	46.0	25.6	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission below 30MHz (Spurious Emission)
Antenna C

DATA OF RADIATED EMISSION TEST

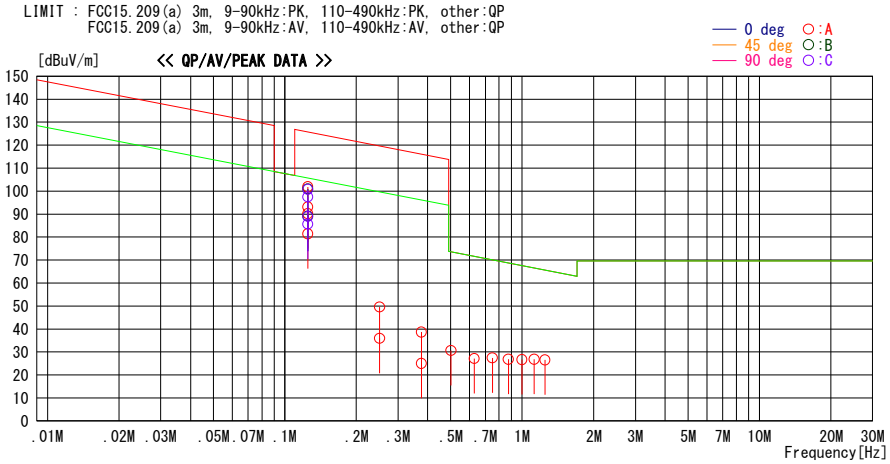
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2011/02/02

Report No. : 31BE0219-HO-04

Temp./ Humi. : 21deg. C. /31% RH
Engineer : Kazuya Yoshioka

Mode / Remarks : Tx 125kHz AntennaC Worst Axis(ECU:X-axis Antenna:X-axis)

LIMIT : FCC15.209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq. [MHz]	Reading [dBuV]	DET	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]		Table [deg]	Comment
0.12500	108.0	PEAK	20.1	5.9	32.1	101.9	125.7	23.8	0	A	359	Worst
0.12500	107.0	PEAK	20.1	5.9	32.1	100.9	125.7	24.8	45	B	326	
0.12500	103.5	PEAK	20.1	5.9	32.1	97.4	125.7	28.3	90	C	281	
0.12500	106.9	PEAK	20.1	5.9	32.1	100.8	125.7	24.9	135	C	23	
0.12500	95.1	AV	20.1	5.9	32.1	89.0	105.7	16.7	135	C	23	
0.12500	91.8	AV	20.1	5.9	32.1	85.7	105.7	20.0	90	C	281	
0.12500	95.2	AV	20.1	5.9	32.1	89.1	105.7	16.6	45	B	326	
0.12500	96.2	AV	20.1	5.9	32.1	90.1	105.7	15.6	0	A	359	Worst
0.12500	99.2	PEAK	20.1	5.9	32.1	93.1	125.7	32.6	0	A	180	Hori
0.12500	87.5	AV	20.1	5.9	32.1	81.4	105.7	24.3	0	A	180	Hori
0.25049	23.6	PEAK	20.0	6.0	0.0	49.6	119.6	70.0	0	A	359	
0.25049	10.0	AV	20.0	6.0	0.0	36.0	99.6	63.6	0	A	359	
0.37575	12.7	PEAK	19.9	6.0	0.0	38.6	116.1	77.5	0	A	359	
0.37575	-0.9	AV	19.9	6.0	0.0	25.0	96.1	71.1	0	A	359	
0.50098	4.7	QP	19.9	6.0	0.0	30.6	73.6	43.0	0	A	359	
0.62818	1.2	QP	19.9	6.0	0.0	27.1	71.6	44.5	0	A	359	
0.75000	1.5	QP	19.9	6.0	0.0	27.4	70.1	42.7	0	A	359	
0.87500	0.9	QP	19.9	6.0	0.0	26.8	68.7	41.9	0	A	359	
1.00000	0.8	QP	19.9	6.0	0.0	26.7	67.6	40.9	0	A	358	
1.12500	0.8	QP	19.9	6.1	0.0	26.8	66.5	39.7	0	A	359	
1.25000	0.5	QP	19.9	6.1	0.0	26.5	65.6	39.1	0	A	359	

CHART: WITH FACTOR , ANT TYPE: LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB](CABLE + ATTEN.- AMP.)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission above 30MHz (Spurious Emission)
Antenna C

DATA OF RADIATED EMISSION TEST

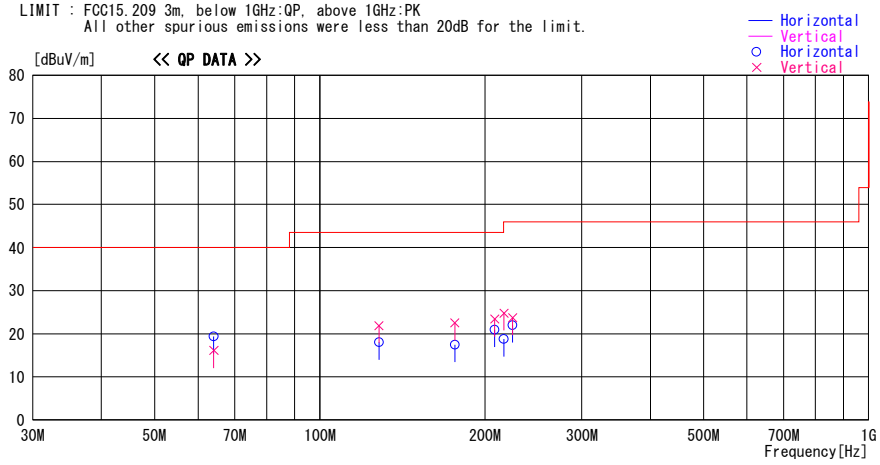
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2011/02/03

Report No. : 31BE0219-HO-04

Temp. / Humi. : 24deg.C / 34% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 125kAntenna C Worst Axis (ECU Hori: Y Vert: Y, Ant Hori: X, Vert: X)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
64.128	36.2	QP	7.7	-24.5	19.4	355	314	Hori.	40.0	20.6	
64.129	32.9	QP	7.7	-24.5	16.1	287	100	Vert.	40.0	23.9	
128.252	27.9	QP	13.7	-23.6	18.0	138	239	Hori.	43.5	25.5	
128.251	31.8	QP	13.7	-23.6	21.9	1	100	Vert.	43.5	21.6	
176.342	29.7	QP	16.0	-23.2	22.5	157	100	Vert.	43.5	21.0	
176.356	24.7	QP	16.0	-23.2	17.5	352	204	Hori.	43.5	26.0	
208.409	29.5	QP	16.8	-22.9	23.4	359	100	Vert.	43.5	20.1	
208.409	27.0	QP	16.8	-22.9	20.9	49	160	Hori.	43.5	22.6	
216.429	30.8	QP	16.9	-22.9	24.8	6	100	Vert.	46.0	21.2	
216.427	24.8	QP	16.9	-22.9	18.8	65	235	Hori.	46.0	27.2	
224.444	29.5	QP	17.0	-22.8	23.7	6	100	Vert.	46.0	22.3	
224.444	27.8	QP	17.0	-22.8	22.0	178	143	Hori.	46.0	24.0	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission below 30MHz (Spurious Emission)
Antenna F

DATA OF RADIATED EMISSION TEST

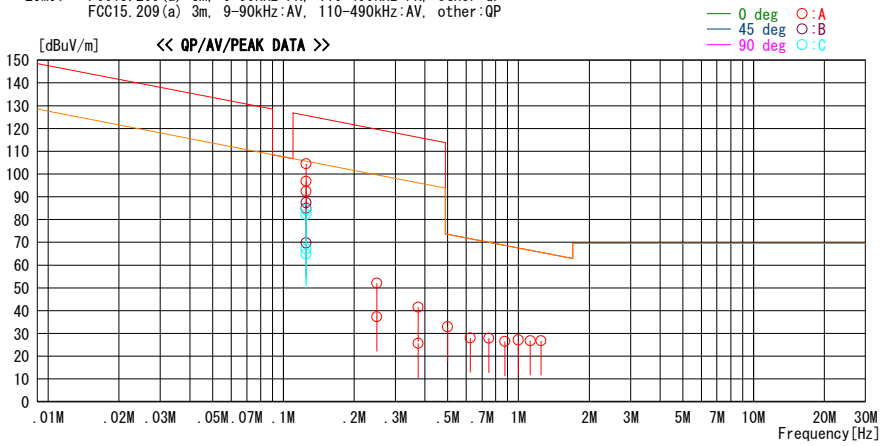
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2011/02/02

Report No. : 31BE0219-HO-04

Temp./ Humi. : 21deg. C. /31% RH
Engineer : Kazuya Yoshioka

Mode / Remarks : Tx 125kHz AntennaF Worst Axis(ECU:X-axis Antenna:X-axis)

LIMIT : FCC15.209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin	Antenna		Table	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]		[deg]	
0.12500	110.6	PEAK	20.1	5.9	32.1	104.5	125.7	21.2	0	A	7	Worst
0.12500	98.5	AV	20.1	5.9	32.1	92.4	105.7	13.3	0	A	7	Worst
0.12500	93.5	PEAK	20.1	5.9	32.1	87.4	125.7	38.3	45	B	161	
0.12500	75.8	AV	20.1	5.9	32.1	69.7	105.7	36.0	45	B	161	
0.12500	88.2	PEAK	20.1	5.9	32.1	82.1	125.7	43.6	90	C	284	
0.12500	70.9	AV	20.1	5.9	32.1	64.8	105.7	40.9	90	C	284	
0.12500	90.4	PEAK	20.1	5.9	32.1	84.3	125.7	41.4	135	C	40	
0.12500	73.2	AV	20.1	5.9	32.1	67.1	105.7	38.6	135	C	40	
0.12500	102.9	PEAK	20.1	5.9	32.1	96.8	125.7	28.9	0	A	359	Hori
0.12500	91.1	AV	20.1	5.9	32.1	85.0	105.7	20.7	0	A	359	Hori
0.25000	11.3	AV	20.0	6.0	0.0	37.3	99.7	62.4	0	A	353	
0.25000	26.1	PEAK	20.0	6.0	0.0	52.1	119.7	67.6	0	A	353	
0.37500	-0.3	AV	19.9	6.0	0.0	25.6	96.1	70.5	0	A	347	
0.37500	15.6	PEAK	19.9	6.0	0.0	41.5	116.1	74.6	0	A	347	
0.50000	7.0	QP	19.9	6.0	0.0	32.9	73.6	40.7	0	A	353	
0.62500	2.1	QP	19.9	6.0	0.0	28.0	71.7	43.7	0	A	352	
0.75000	2.0	QP	19.9	6.0	0.0	27.9	70.1	42.2	0	A	351	
0.87500	0.7	QP	19.9	6.0	0.0	26.6	68.7	42.1	0	A	350	
1.00000	1.2	QP	19.9	6.0	0.0	27.1	67.6	40.5	0	A	351	
1.12500	0.8	QP	19.9	6.1	0.0	26.8	66.5	39.7	0	A	352	
1.25000	0.9	QP	19.9	6.1	0.0	26.9	65.6	38.7	0	A	353	

CHART: WITH FACTOR , ANT TYPE: LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB](CABLE + ATTEN.- AMP.)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission above 30MHz (Spurious Emission)
Antenna F

DATA OF RADIATED EMISSION TEST

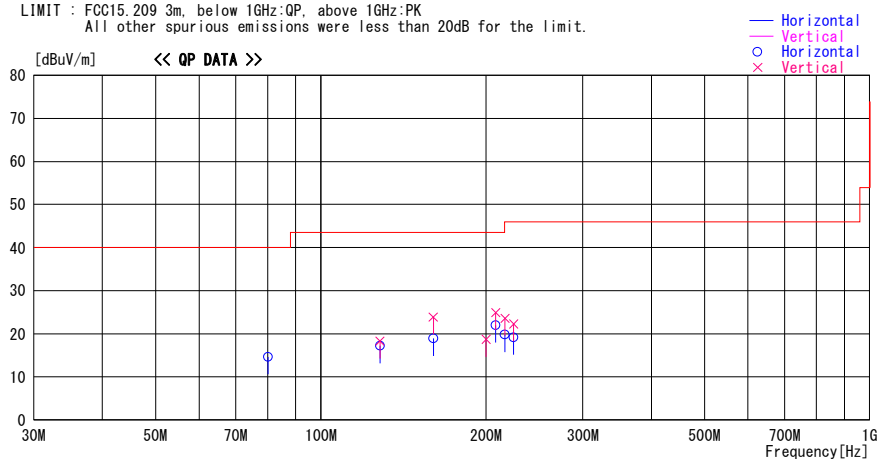
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2011/02/03

Report No. : 31BE0219-HO-04

Temp. / Humi. : 24deg.C / 34% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 125kAntenna F Worst Axis (ECU Hori: Y Vert: Y, Ant Hori: Z, Vert: Z)

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
80.165	32.4	QP	6.6	-24.4	14.6	310	231	Hori.	40.0	25.4	
128.262	28.2	QP	13.7	-23.6	18.3	23	100	Vert.	43.5	25.2	
128.262	27.1	QP	13.7	-23.6	17.2	310	254	Hori.	43.5	26.3	
160.327	31.7	QP	15.5	-23.3	23.9	134	100	Vert.	43.5	19.6	
160.334	26.7	QP	15.5	-23.3	18.9	353	294	Hori.	43.5	24.6	
200.003	25.0	QP	16.7	-23.0	18.7	7	100	Vert.	43.5	24.8	
208.438	28.1	QP	16.8	-22.9	22.0	352	244	Hori.	43.5	21.5	
208.421	31.0	QP	16.8	-22.9	24.9	234	100	Vert.	43.5	18.6	
216.448	25.8	QP	16.9	-22.9	19.8	5	244	Hori.	46.0	26.2	
216.443	29.6	QP	16.9	-22.9	23.6	359	100	Vert.	46.0	22.4	
224.466	25.0	QP	17.0	-22.8	19.2	1	222	Hori.	46.0	26.8	
224.462	28.1	QP	17.0	-22.8	22.3	6	100	Vert.	46.0	23.7	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

-26dB Bandwidth and 99% Occupied Bandwidth
Antenna A

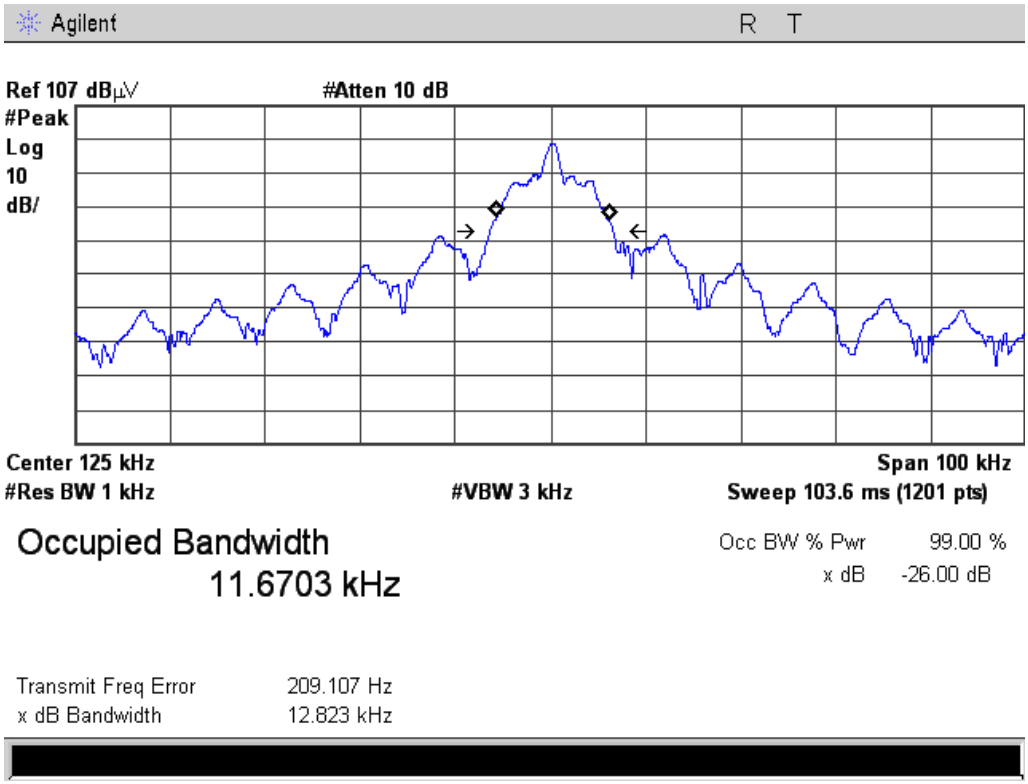
UL Japan, Inc.
Head Office EMC Lab. No.4 Semi Anechoic Chamber

REPORT NO : 31BE0219-HO-04

TEST DISTANCE : 3m
DATE : 02/02/2011
TEMPERATURE : 21 deg.C
HUMIDITY : 31 % RH
Engineer : Kazuya Yoshioka

MODE : Tx
: Antenna A

FREQ [kHz]	-26dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
125.0	12.823	11.670



-26dB Bandwidth and 99% Occupied Bandwidth
Antenna C

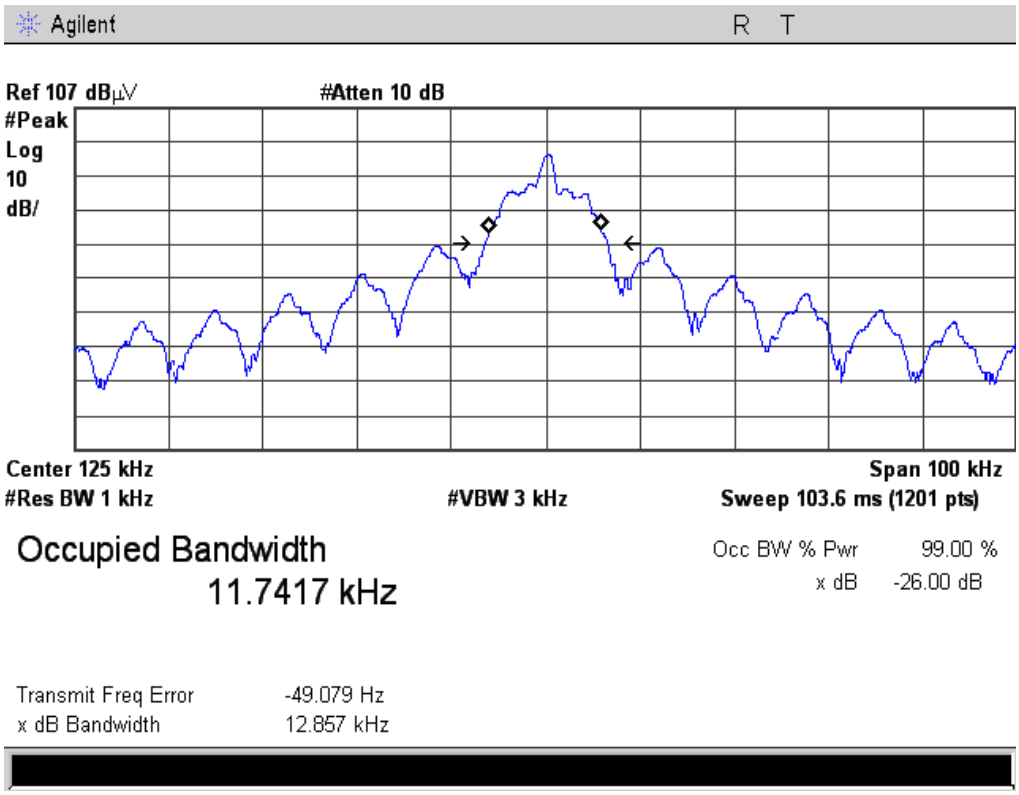
UL Japan, Inc.
Head Office EMC Lab. No.4 Semi Anechoic Chamber

REPORT NO : 31BE0219-HO-04

TEST DISTANCE : 3m
DATE : 02/02/2011
TEMPERATURE : 21 deg.C
HUMIDITY : 31 % RH
Engineer : Kazuya Yoshioka

MODE : Tx
: Antenna C

FREQ [kHz]	-26dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
125.0	12.857	11.742



-26dB Bandwidth and 99% Occupied Bandwidth
Antenna F

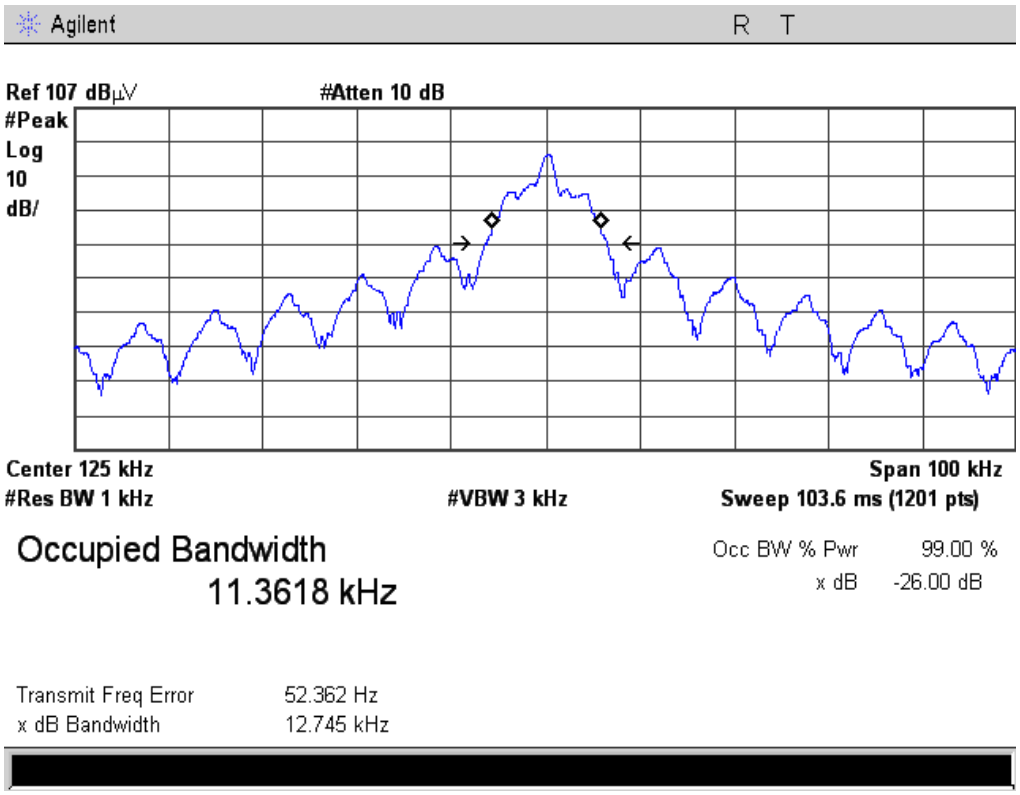
UL Japan, Inc.
Head Office EMC Lab. No.4 Semi Anechoic Chamber

REPORT NO : 31BE0219-HO-04

TEST DISTANCE : 3m
DATE : 02/02/2011
TEMPERATURE : 21 deg.C
HUMIDITY : 31 % RH
Engineer : Kazuya Yoshioka

MODE : Tx
: Antenna F

FREQ [kHz]	-26dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
125.0	12.745	11.362



APPENDIX 3: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2010/02/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2010/02/09 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
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
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	836553/009	RE	2010/12/08 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	RE	2010/07/21 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2010/07/20 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2010/03/05 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2010/11/30 * 12
MAT-51	Attenuator(6dB)	Weinschel	2	AS3557	RE	2011/01/14 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2010/10/11 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2010/10/11 * 12
MCC-50	Coaxial cable	UL Japan	-	-	RE	2010/03/18 * 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:
RE: Radiated emission, -26dB Bandwidth and 99% Occupied Bandwidth