APPENDIX 2: Data of EMI test

Radiated Emission below 30MHz (Fundamental Emission)

(88.8kHz)

DATA OF RADIATED EMISSION TEST

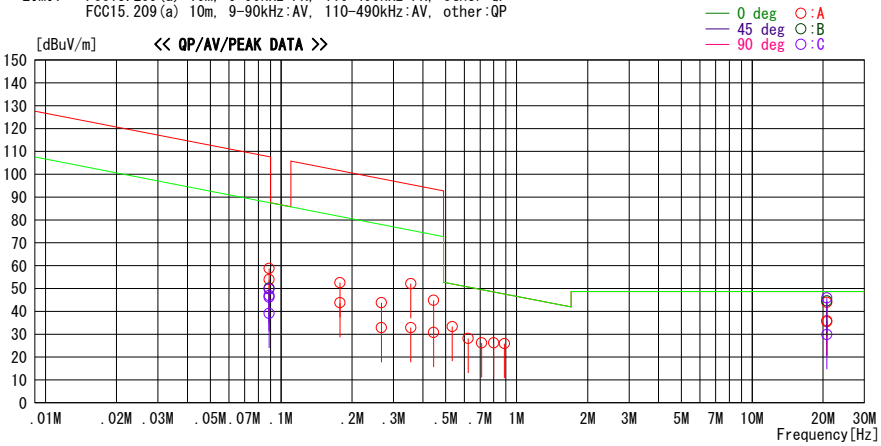
UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2011/01/10

Report No. : 31EE0097-HO

Temp. / Humi. : 24deg. C / 31%
Engineer : Tomotaka Sasagawa

Mode / Remarks : Continuous Operation mode

LIMIT : FCC15.209(a) 10m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 10m, 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]	
0.08880	64.9	PEAK	20.1	6.0	32.2	58.8	107.7	48.9	0	A	2	
0.08880	56.2	PEAK	20.1	6.0	32.2	50.1	107.7	57.6	45	B	90	
0.08880	52.3	PEAK	20.1	6.0	32.2	46.2	107.7	61.5	90	C	0	
0.08880	60.0	AV	20.1	6.0	32.2	53.9	87.7	33.8	0	A	2	
0.08880	55.9	PEAK	20.1	6.0	32.2	49.8	107.7	57.9	135	C	89	
0.08880	53.1	PEAK	20.1	6.0	32.2	47.0	107.7	60.7	180	C	4	
0.08880	45.2	PEAK	20.1	6.0	32.2	39.1	107.7	68.6	0	C	0	HOR
0.17760	49.9	AV	20.0	6.0	32.1	43.8	81.6	37.8	0	A	112	
0.17760	58.7	PEAK	20.0	6.0	32.1	52.6	101.6	49.0	0	A	112	
0.26640	38.9	AV	20.0	6.1	32.1	32.9	78.1	45.2	0	A	32	
0.26640	49.8	PEAK	20.0	6.1	32.1	43.8	98.1	54.3	0	A	32	
0.35520	39.0	AV	19.9	6.1	32.1	32.9	75.6	42.7	0	A	45	
0.35520	58.2	PEAK	19.9	6.1	32.1	52.1	95.6	43.5	0	A	45	
0.44400	36.9	AV	19.9	6.1	32.1	30.8	73.7	42.9	0	A	120	
0.44400	51.0	PEAK	19.9	6.1	32.1	44.9	93.7	48.8	0	A	120	
0.53280	39.4	QP	19.9	6.1	32.1	33.3	52.1	18.8	0	A	42	
0.62160	34.2	QP	19.9	6.2	32.1	28.2	50.7	22.5	0	A	0	
0.71040	32.3	QP	19.9	6.2	32.1	26.3	49.6	23.3	0	A	0	
0.79920	32.1	QP	19.9	6.2	32.0	26.2	48.6	22.4	0	A	0	
0.88800	31.8	QP	19.9	6.2	32.0	25.9	47.7	21.8	0	A	0	
20.72795	39.8	QP	20.4	7.4	32.1	35.5	48.6	13.1	0	A	217	
20.72795	48.9	QP	20.4	7.4	32.1	44.6	48.6	4.0	45	B	234	
20.72795	40.2	QP	20.4	7.4	32.1	35.9	48.6	12.7	180	A	231	
20.72795	48.2	QP	20.4	7.4	32.1	43.9	48.6	4.7	135	A	221	
20.72795	50.2	QP	20.4	7.4	32.1	45.9	48.6	2.7	90	C	9	
20.72795	34.1	QP	20.4	7.4	32.1	29.8	48.6	18.8	0	C	0	HOR

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

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

Radiated Emission below 30MHz (Fundamental Emission)

(353.25kHz)

DATA OF RADIATED EMISSION TEST

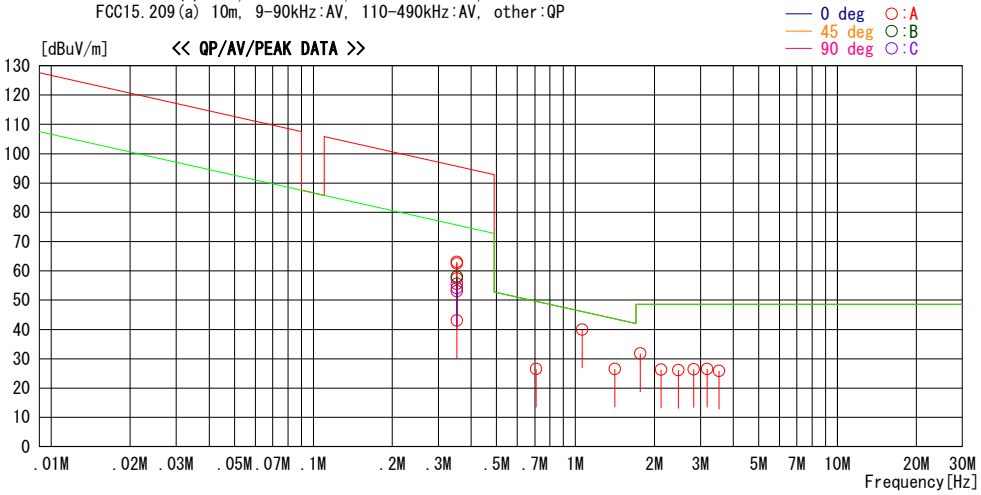
UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2011/01/10

Report No. : 31EE0097-HO

Temp. / Humi. : 24deg. C / 31%
Engineer : Tomotaka Sasagawa

Mode / Remarks : Continuous Operation mode

LIMIT : FCC15.209(a) 10m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 10m, 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
0.35325	69.1	PEAK	19.9	6.1	32.1	63.0	95.6	32.6	0	A	269	
0.35325	64.2	PEAK	19.9	6.1	32.1	58.1	95.6	37.5	45	B	64	
0.35325	60.2	PEAK	19.9	6.1	32.1	54.1	95.6	41.5	90	C	188	
0.35325	63.5	PEAK	19.9	6.1	32.1	57.4	95.6	38.2	135	A	124	
0.35325	59.2	PEAK	19.9	6.1	32.1	53.1	95.6	42.5	180	A	245	
0.35325	61.6	AV	19.9	6.1	32.1	55.5	75.6	20.1	0	A	269	
0.35325	68.6	QP	19.9	6.1	32.1	62.5	95.6	33.1	0	A	269	
0.35325	49.2	PEAK	19.9	6.1	32.1	43.1	95.6	52.5	0	A	0	HOR
0.70650	32.5	QP	19.9	6.2	32.1	26.5	49.6	23.1	0	A	0	
1.05975	45.8	QP	19.9	6.2	32.0	39.9	46.1	6.2	0	A	234	
1.41300	32.3	QP	19.9	6.3	32.0	26.5	43.6	17.1	0	A	0	
1.76625	37.5	QP	19.9	6.3	32.0	31.7	48.6	16.9	0	A	221	
2.11950	32.1	QP	19.9	6.3	32.0	26.3	48.6	22.3	0	A	0	
2.47275	31.9	QP	19.9	6.4	32.0	26.2	48.6	22.4	0	A	0	
2.82600	32.1	QP	19.9	6.4	32.0	26.4	48.6	22.2	0	A	0	
3.17925	32.0	QP	20.0	6.5	32.0	26.5	48.6	22.1	0	A	0	
3.53250	31.5	QP	20.0	6.5	32.1	25.9	48.6	22.7	0	A	0	

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

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

Radiated Emission below 30MHz (Spurious Emission)

DATA OF RADIATED EMISSION TEST

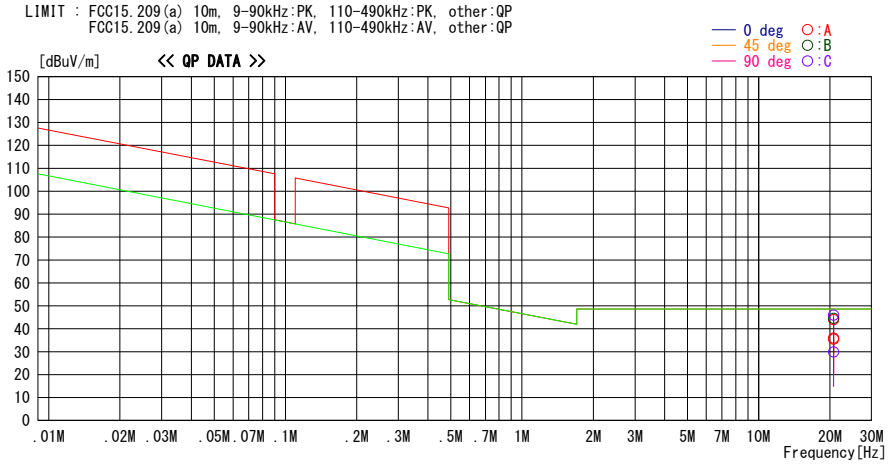
UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2011/01/10

Report No. : 31EE0097-HO

Temp. / Humi. : 24deg. C / 31%
Engineer : Tomotaka Sasagawa

Mode / Remarks : Continuous Operation mode

LIMIT : FCC15.209(a) 10m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 10m, 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
20.72795	39.8	QP	20.4	7.4	32.1	35.5	48.6	13.1	0	A	217	
20.72795	48.9	QP	20.4	7.4	32.1	44.6	48.6	4.0	45	B	234	
20.72795	40.2	QP	20.4	7.4	32.1	35.9	48.6	12.7	180	A	231	
20.72795	48.2	QP	20.4	7.4	32.1	43.9	48.6	4.7	135	A	221	
20.72795	50.2	QP	20.4	7.4	32.1	45.9	48.6	2.7	90	C	9	
20.72795	34.1	QP	20.4	7.4	32.1	29.8	48.6	18.8	0	C	0	HOR

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

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

Radiated Emission above 30MHz (Spurious Emission)

DATA OF RADIATED EMISSION TEST

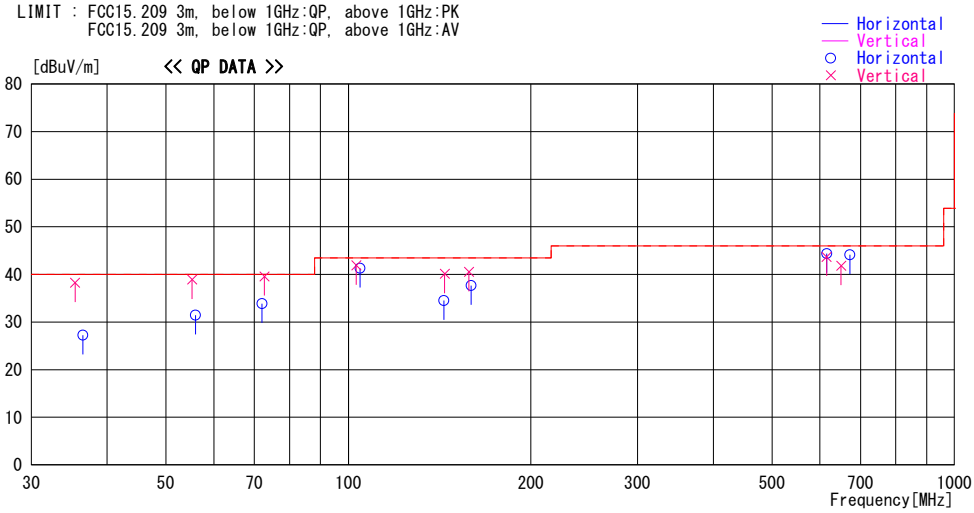
UL Japan, Inc. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2011/01/10

Report No. : 31EE0097-HO

Temp./Humi. : 22deg.C / 34%
Engineer : Tomotaka Sasagawa

Mode / Remarks : Continuous Operation mode

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK
FCC15.209 3m, below 1GHz:QP, above 1GHz:AV



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
35.411	55.8	QP	16.3	-33.9	38.2	352	100	Vert.	40.0	1.8	
36.493	45.4	QP	15.8	-33.9	27.3	307	312	Hori.	40.0	12.7	
55.972	55.8	QP	9.1	-33.4	31.5	5	265	Hori.	40.0	8.5	
55.229	63.0	QP	9.3	-33.4	38.9	223	100	Vert.	40.0	1.1	
72.702	66.4	QP	6.4	-33.2	39.6	198	100	Vert.	40.0	0.4	
72.000	60.7	QP	6.4	-33.2	33.9	301	256	Hori.	40.0	6.1	
104.592	63.4	QP	10.4	-32.5	41.3	226	298	Hori.	43.5	2.2	
103.046	64.2	QP	10.2	-32.5	41.9	359	100	Vert.	43.5	1.6	
144.206	57.8	QP	14.1	-31.8	40.1	171	100	Vert.	43.5	3.4	
143.666	52.2	QP	14.1	-31.8	34.5	99	290	Hori.	43.5	9.0	
158.078	56.9	QP	15.2	-31.6	40.5	197	100	Vert.	43.5	3.0	
159.453	54.0	QP	15.3	-31.6	37.7	195	345	Hori.	43.5	5.8	
615.633	52.1	QP	20.4	-28.1	44.4	143	100	Hori.	46.0	1.6	
615.633	51.4	QP	20.4	-28.1	43.7	289	100	Vert.	46.0	2.3	
671.746	51.2	QP	20.7	-27.8	44.1	184	100	Hori.	46.0	1.9	
649.942	49.1	QP	20.6	-27.9	41.8	23	100	Vert.	46.0	4.2	

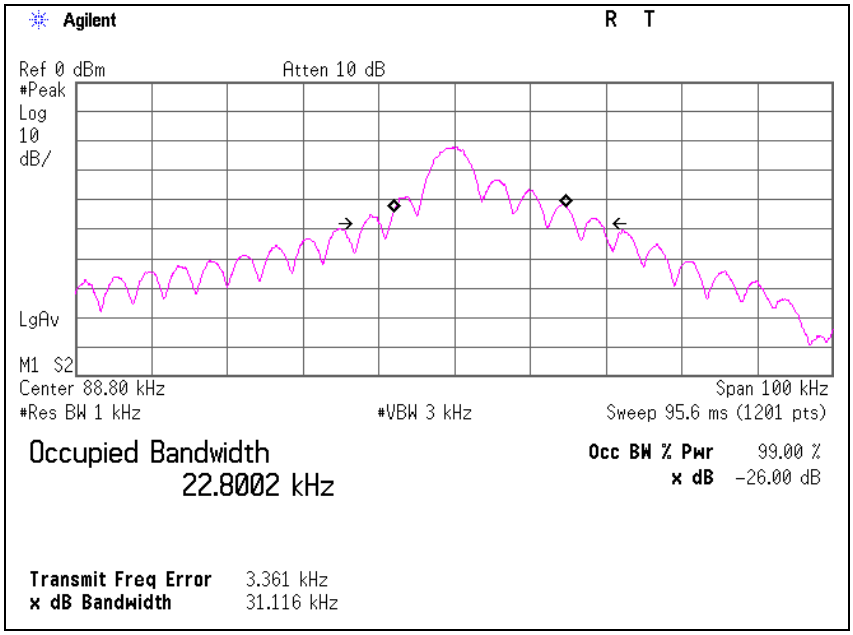
CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - GAIN(AMP)

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

-26dB Bandwidth

Test place	Head Office EMC Lab. No.1 Semi Anechoic Chamber
Report No.	31EE0097-HO
Date	01/10/2011
Temperature/ Humidity	23 deg.C./ 32%
Engineer	Tomotaka Sasagawa
Mode	Transmitting 88.8kHz

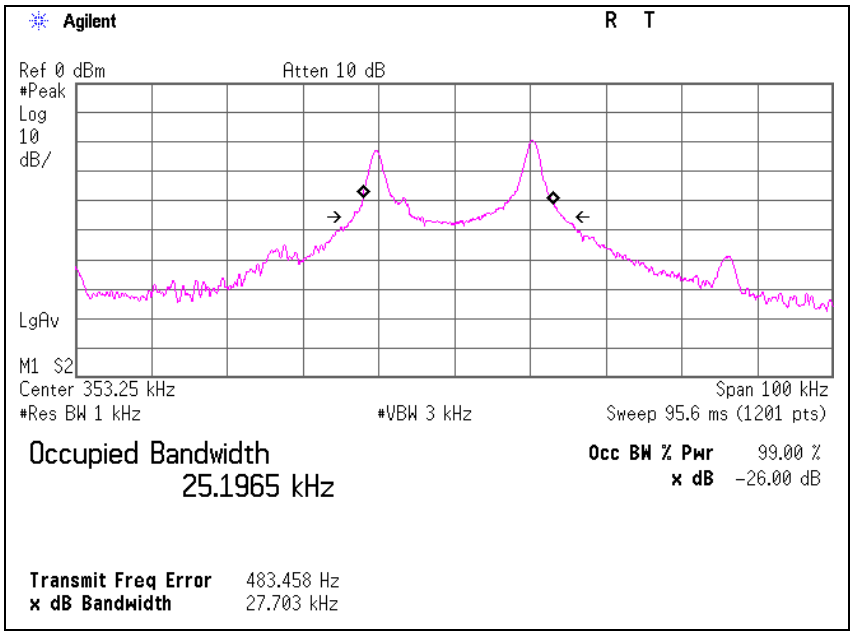
FREQ [kHz]	-26dB Bandwidth [kHz]
88.8	31.116



-26dB Bandwidth

Test place	Head Office EMC Lab. No.1 Semi Anechoic Chamber
Report No.	31EE0097-HO
Date	01/10/2011
Temperature/ Humidity	23 deg.C./ 32%
Engineer	Tomotaka Sasagawa
Mode	Transmitting 353.25kHz

FREQ [kHz]	-26dB Bandwidth [kHz]
353.25	27.703



APPENDIX 3: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2010/07/02 * 12
MOS-01	Digital Humidity Indicator	N.T	NT-1800	MOS01	RE	2010/02/09 * 12
MJM-01	Measure	KDS	ES19-55	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE	2010/12/07 * 12
KBA-05	Biconical Antenna	Schwarzbeck	BBA9106	2513	RE	2010/10/15 * 12
KLA-04	Logperiodic Antenna	Schwarzbeck	USLP9143	361	RE	2010/10/16 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2010/11/05 * 12
MCC-01	Coaxial Cable 0.1-3000MHz	Suhner/storm/Agilent/ TSJ	-	-	RE	2010/10/14 * 12
MPA-20	Pre Amplifier	Elena	EPA-4020YA	030801	RE	2010/03/23 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	836553/009	RE	2010/12/08 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2010/07/20 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m)/RFM-E421(Switcher)	- /01068(Switcher)	RE	2010/01/05 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2010/03/05 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2010/02/03 * 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