

APPENDIX 2: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

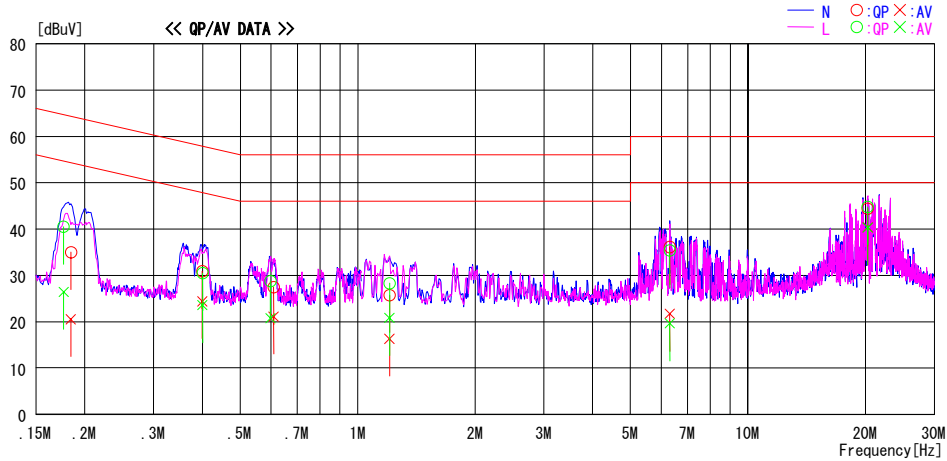
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2010/08/27

Report No. : 31AE0134-HO-01

Temp./Humi. : 24deg. C. / 63%
Engineer : Hisayoshi Sato

Mode / Remarks : Communication mode 134.2kHz, With Tag

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]		
0.18393	21.8	7.3	13.2	35.0	20.5	64.3	54.3	29.3	33.8	N	
0.39969	17.6	11.1	13.3	30.9	24.4	57.9	47.9	27.0	23.5	N	
0.60849	14.2	7.8	13.3	27.5	21.1	56.0	46.0	28.5	24.9	N	
1.20675	12.4	3.0	13.3	25.7	16.3	56.0	46.0	30.3	29.7	N	
6.30406	22.4	8.0	13.7	36.1	21.7	60.0	50.0	23.9	28.3	N	
20.25572	29.6	25.6	14.8	44.4	40.4	60.0	50.0	15.6	9.7	N	
0.17630	27.3	13.2	13.2	40.5	26.4	64.7	54.7	24.2	28.3	L	
0.40031	17.1	10.2	13.3	30.4	23.5	57.8	47.8	27.4	24.3	L	
0.59730	15.5	7.4	13.3	28.8	20.7	56.0	46.0	27.2	25.3	L	
1.20675	15.0	7.5	13.3	28.3	20.8	56.0	46.0	27.7	25.2	L	
6.30406	21.7	5.9	13.7	35.4	19.6	60.0	50.0	24.6	30.4	L	
20.25572	30.0	25.5	14.8	44.8	40.3	60.0	50.0	15.2	9.7	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.

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

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
 Date : 2010/08/27

Report No. : 31AE0134-H0-01
 Temp./Humi. : 24deg. C. / 63%
 Engineer : Hisayoshi Sato

Mode / Remarks : Communication mode 134.2kHz, Without

LIMIT : FCC15.207 QP
 FCC15.207 AV

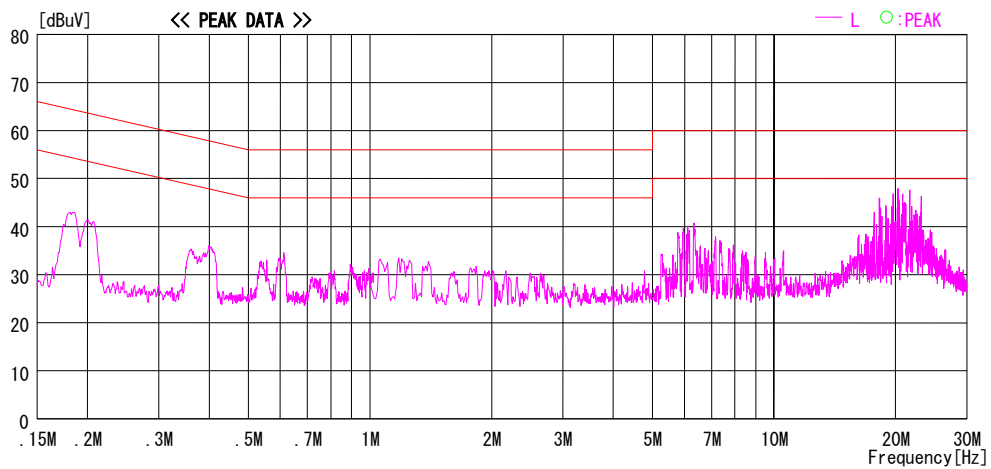
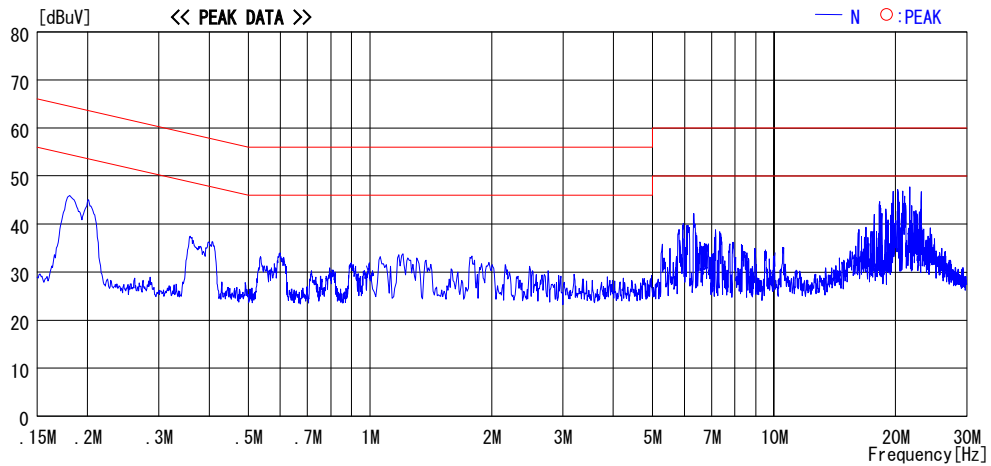


CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT [dBuV] = READING [dBuV] + C. F [dB] (LISN LOSS + CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

Radiated Emission below 30MHz (Fundamental and Spurious Emission)

DATA OF RADIATED EMISSION TEST

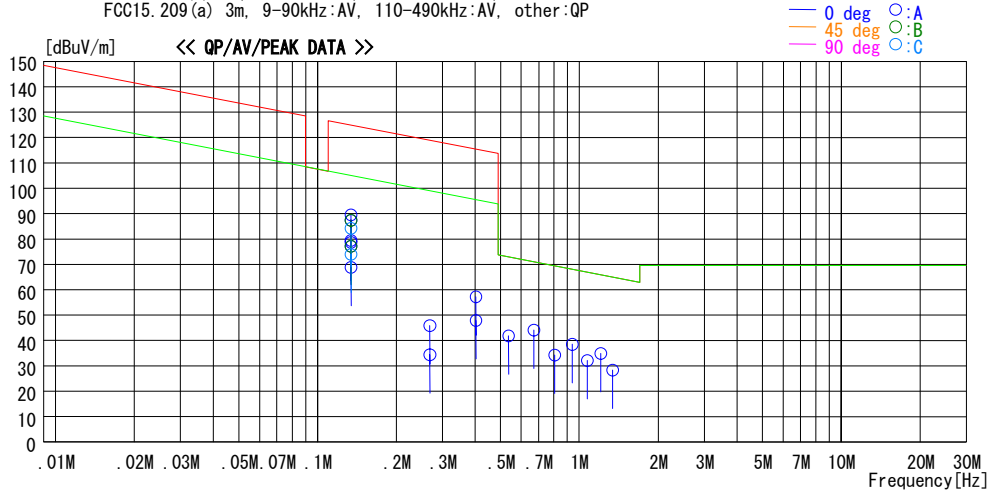
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2010/08/26

Report No. : 31AE0134-HO-01

Temp./ Humi. : 24deg. C. / 65%
Engineer : Satofumi Matsuyama

Mode / Remarks : Communication mode 134.2kHz, With Tag, Worst Axis(Ant:X , EUT:X)

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]	
0.13420	95.8	PEAK	19.9	5.9	32.1	89.5	125.0	35.5	0	A	0 Worst
0.13420	85.7	AV	19.9	5.9	32.1	79.4	105.0	25.6	0	A	0 Worst
0.13420	93.7	PEAK	19.9	5.9	32.1	87.4	125.0	37.6	45	B	332
0.13420	83.4	AV	19.9	5.9	32.1	77.1	105.0	27.9	45	B	332
0.13420	90.5	PEAK	19.9	5.9	32.1	84.2	125.0	40.8	90	C	274
0.13420	80.3	AV	19.9	5.9	32.1	74.0	105.0	31.0	90	C	274
0.13420	93.7	PEAK	19.9	5.9	32.1	87.4	125.0	37.6	135	A	19
0.13420	83.4	AV	19.9	5.9	32.1	77.1	105.0	27.9	135	A	19
0.13420	85.0	PEAK	19.9	5.9	32.1	78.7	125.0	46.3	0	A	0 Loop:Hor
0.13420	75.1	AV	19.9	5.9	32.1	68.8	105.0	36.2	0	A	0 Loop:Hor
0.26840	52.4	PEAK	19.7	6.0	32.1	46.0	119.0	73.0	0	A	352
0.26840	40.8	AV	19.7	6.0	32.1	34.4	99.0	64.6	0	A	352
0.40260	63.7	PEAK	19.7	6.0	32.1	57.3	115.5	58.2	0	A	356
0.40260	54.3	AV	19.7	6.0	32.1	47.9	95.5	47.6	0	A	356
0.53680	48.3	QP	19.6	6.0	32.1	41.8	73.0	31.2	0	A	276
0.67100	50.6	QP	19.6	6.0	32.1	44.1	71.1	27.0	0	A	0
0.80520	40.6	QP	19.6	6.0	32.0	34.2	69.5	35.3	0	A	77
0.93940	44.9	QP	19.6	6.0	32.0	38.5	68.1	29.6	0	A	358
1.07360	38.6	QP	19.6	6.0	32.0	32.2	66.9	34.7	0	A	94
1.20780	41.2	QP	19.6	6.1	32.0	34.9	65.9	31.0	0	A	0
1.34200	34.6	QP	19.6	6.1	32.0	28.3	65.0	36.7	0	A	101

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.) - 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 and Spurious Emission)

DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2010/08/26

Report No. : 31AE0134-HO-01

Temp./ Humi. : 24deg. C. / 65%
Engineer : Satofumi Matsuyama

Mode / Remarks : Communication mode 134.2kHz, Without Tag, Worst Axis(Ant:X, EUT:X)

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

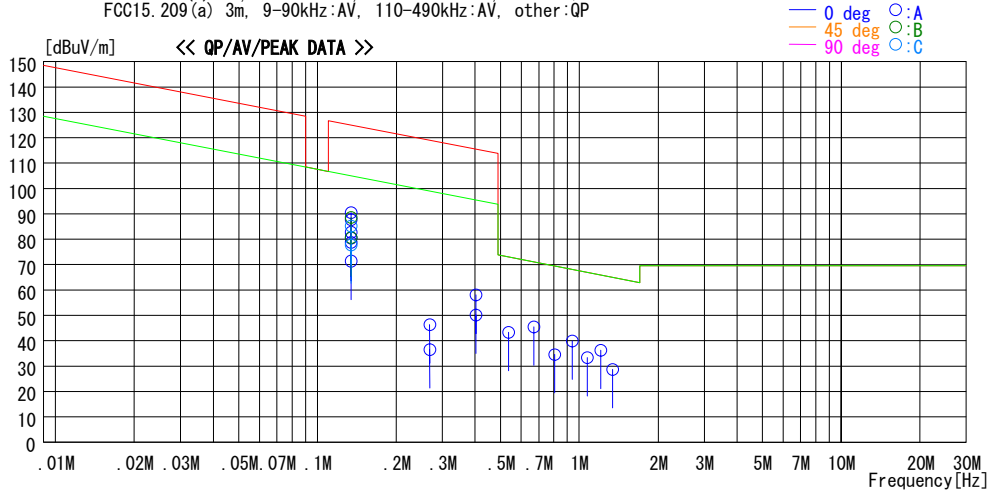


CHART: WITH FACTOR, ANT TYPE: LOOP, Except for the data below : adequate margin data below the limits.
CALCULATION : RESULT[dBuV] = READING[dBuV] + ANT FACTOR[dB] + LOSS[dB] (CABLE + ATTEN.) - GAIN (AMP).

Radiated Emission above 30MHz (Spurious Emission)

DATA OF RADIATED EMISSION TEST

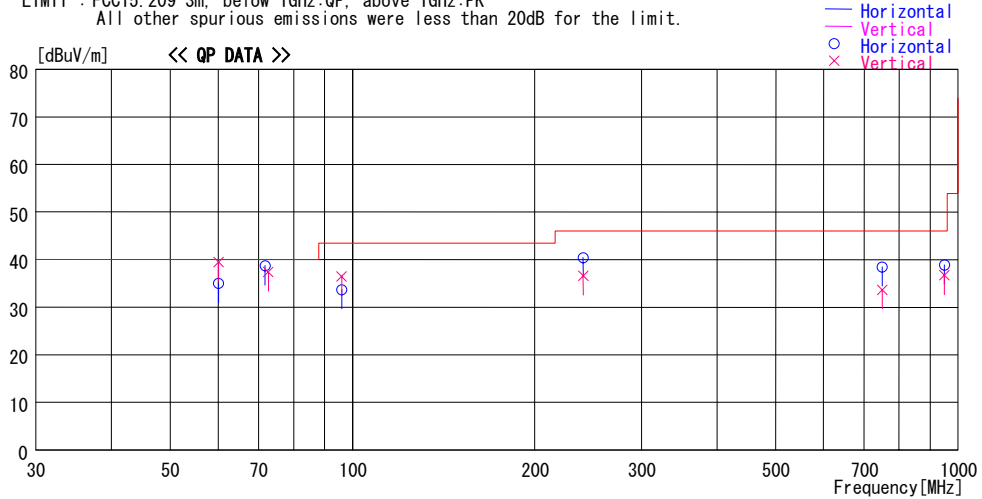
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Date : 2010/08/26

Report No. : 31AE0134-HO-01

Temp./Humi. : 24deg. C. / 65%
 Engineer : Satofumi Matsuyama

Mode / Remarks : Communication mode 134.2kHz, With Tag, Worst-Axis(Ant:X , EUT: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		Level [dBuV/m]	Angle [Deg.]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss & Gain [dB]							
60.121	51.5	QP	8.1	-24.6	35.0	105	300	Hori.	40.0	5.0	
60.124	56.0	QP	8.1	-24.6	39.5	5	100	Vert.	40.0	0.5	
72.632	55.4	QP	6.5	-24.5	37.4	333	100	Vert.	40.0	2.6	
71.694	56.6	QP	6.5	-24.4	38.7	98	228	Hori.	40.0	1.3	
96.024	51.2	QP	9.4	-24.1	36.5	90	100	Vert.	43.5	7.0	
96.027	48.4	QP	9.4	-24.1	33.7	76	175	Hori.	43.5	9.8	
240.493	45.8	QP	17.3	-22.7	40.4	28	135	Hori.	46.0	5.6	
240.493	42.0	QP	17.3	-22.7	36.6	325	100	Vert.	46.0	9.4	
749.990	35.7	QP	22.6	-19.8	38.5	229	124	Hori.	46.0	7.5	
749.997	30.9	QP	22.6	-19.8	33.7	237	100	Vert.	46.0	12.3	
949.992	31.7	QP	25.3	-18.1	38.9	261	100	Hori.	46.0	7.1	
949.992	29.5	QP	25.3	-18.1	36.7	331	117	Vert.	46.0	9.3	

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.

Radiated Emission above 30MHz (Spurious Emission)

DATA OF RADIATED EMISSION TEST

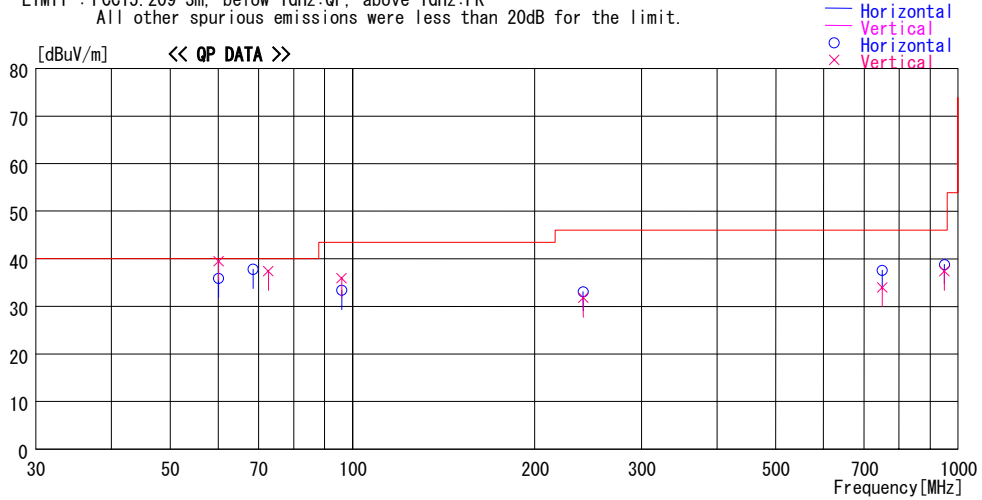
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2010/08/26

Report No. : 31AE0134-HO-01

Temp./Humi. : 24deg. C. / 65%
Engineer : Satorumi Matsuyama

Mode / Remarks: Communication mode 134.2kHz, Without Tag Worst-Axis(Ant:X , EUT: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		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss & Gain [dB]							
60.122	56.0	QP	8.1	-24.6	39.5	2	100	Vert.	40.0	0.5	
60.123	52.4	QP	8.1	-24.6	35.9	115	300	Hori.	40.0	4.1	
68.556	55.5	QP	6.7	-24.4	37.8	83	176	Hori.	40.0	2.2	
72.636	55.4	QP	6.5	-24.5	37.4	354	100	Vert.	40.0	2.6	
96.025	48.1	QP	9.4	-24.1	33.4	84	178	Hori.	43.5	10.1	
96.027	50.6	QP	9.4	-24.1	35.9	88	100	Vert.	43.5	7.6	
240.491	37.2	QP	17.3	-22.7	31.8	319	100	Vert.	46.0	14.2	
240.492	38.5	QP	17.3	-22.7	33.1	25	136	Hori.	46.0	12.9	
749.990	34.8	QP	22.6	-19.8	37.6	273	117	Hori.	46.0	8.4	
749.997	31.2	QP	22.6	-19.8	34.0	314	100	Vert.	46.0	12.0	
949.987	30.2	QP	25.3	-18.1	37.4	350	145	Vert.	46.0	8.6	
949.994	31.6	QP	25.3	-18.1	38.8	334	100	Hori.	46.0	7.2	

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)

-26dB Bandwidth and 99% Occupied Bandwidth

Head Office EMC Lab. No.4 Semi Anechoic Chamber

REPORT NO : 31AE0134-HO-01

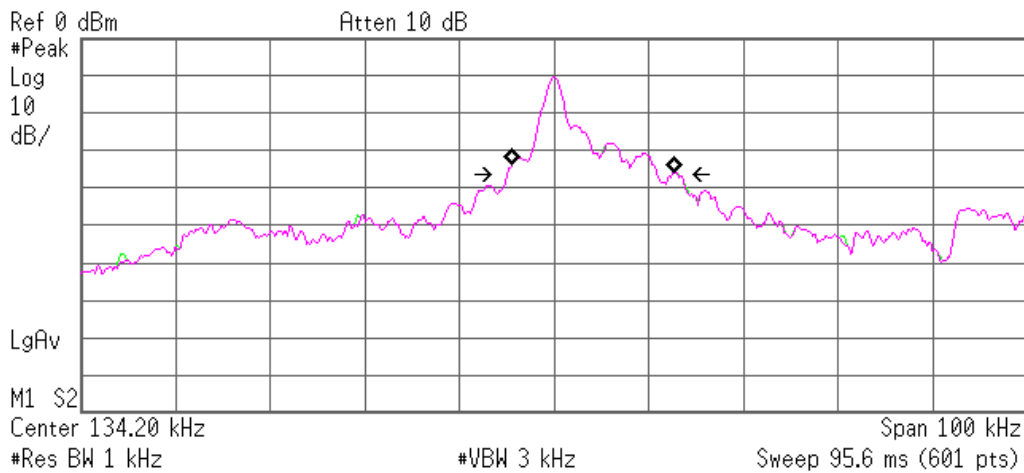
TEST DISTANCE : 3m
 DATE : 08/26/2010
 TEMPERATURE : 24 deg.C
 HUMIDITY : 65 %
 Engineer : Satofumi Matsuyama

MODE : Communication
 : With Tag

FREQ	-26dB Bandwidth	-99% Occupied Bandwidth
[kHz]	[kHz]	[kHz]
134.2	18.013	17.217

Agilent

R T



Occupied Bandwidth
 17.2165 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 4.070 kHz
x dB Bandwidth 18.013 kHz

-26dB Bandwidth and 99% Occupied Bandwidth

Head Office EMC Lab. No.4 Semi Anechoic Chamber

REPORT NO : 31AE0134-HO-01

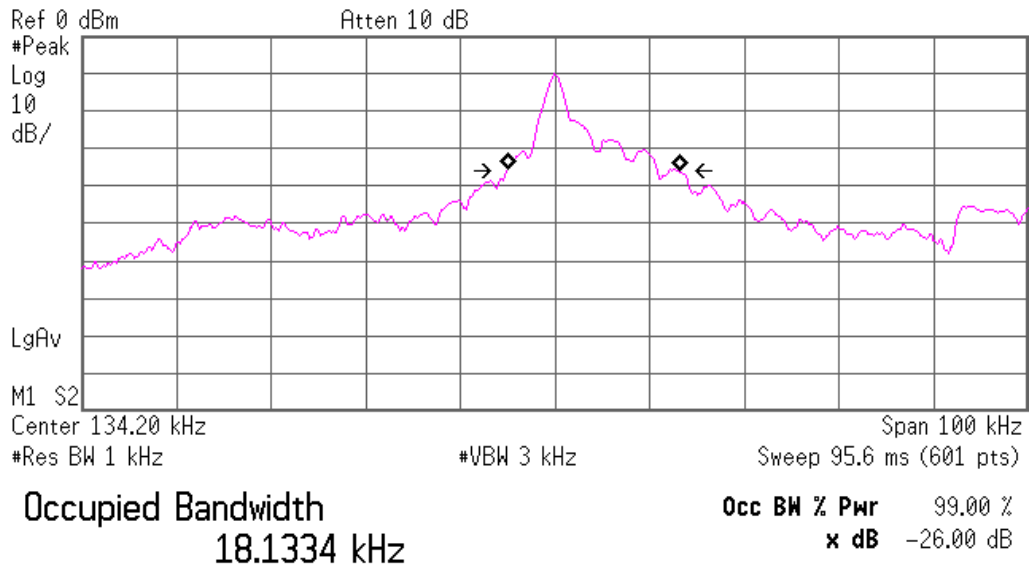
TEST DISTANCE : 3m
 DATE : 08/26/2010
 TEMPERATURE : 24 deg.C
 HUMIDITY : 65 %
 Engineer : Satofumi Matsuyama

MODE : Communication
 : Without Tag

FREQ	-26dB Bandwidth	-99% Occupied Bandwidth
[kHz]	[kHz]	[kHz]
134.2	18.320	18.133

* Agilent

R T



Transmit Freq Error 4.060 kHz
 x dB Bandwidth 18.320 kHz

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/CE	2010/02/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2010/02/09 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE/CE	2009/12/15 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE/CE	2009/10/23 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2009/10/19 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141 (5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	RE/CE	2010/07/21 * 12
MCC-30	Coaxial cable	UL Japan	-	-	RE	2010/07/20 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2010/03/05 * 12
MAT-51	Attenuator(6dB)	Weinschel	2	AS3557	RE	2010/01/20 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2010/03/22 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2010/01/23 * 12
MCC-50	Coaxial cable	UL Japan	-	-	RE	2010/03/18 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2010/02/03 * 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
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2010/02/04 * 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 (Fundamental and Spurious Emission),-26dB Bandwidth and 99% Occupied Bandwidth

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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