

APPENDIX 2: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

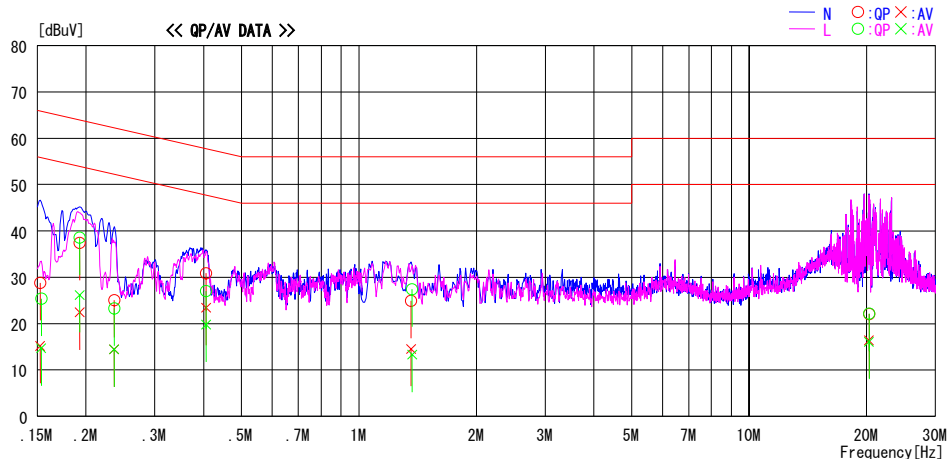
UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2010/08/27

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	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP	AV		QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15261	15.6	2.0	13.2	28.8	15.2	65.9	55.9	37.1	40.7	N	
0.19263	24.2	9.2	13.2	37.4	22.4	63.9	53.9	26.5	31.5	N	
0.23613	11.8	1.1	13.3	25.1	14.4	62.2	52.2	37.1	37.8	N	
0.40578	17.6	10.1	13.3	30.9	23.4	57.7	47.7	26.8	24.3	N	
1.36094	11.6	1.2	13.3	24.9	14.5	56.0	46.0	31.1	31.5	N	
20.27577	7.3	1.5	14.8	22.1	16.3	60.0	50.0	37.9	33.7	N	
0.15348	12.2	1.4	13.2	25.4	14.6	65.8	55.8	40.4	41.2	L	
0.19263	25.3	13.0	13.2	38.5	26.2	63.9	53.9	25.4	27.7	L	
0.23613	10.0	1.1	13.3	23.3	14.4	62.2	52.2	38.9	37.8	L	
0.40578	13.7	6.5	13.3	27.0	19.8	57.7	47.7	30.7	27.9	L	
1.37001	14.1	0.0	13.3	27.4	13.3	56.0	46.0	28.6	32.7	L	
20.27577	7.3	1.3	14.8	22.1	16.1	60.0	50.0	37.9	33.9	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT [dBuV] = READING [dBuV] + C. F [dB] (L IS N 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-HO-01

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Engineer : Hisayoshi Sato

Mode / Remarks: Communication mode 134.2kHz, Without Tag

LIMIT : FCC15.207 OP
FCC15.207 AV

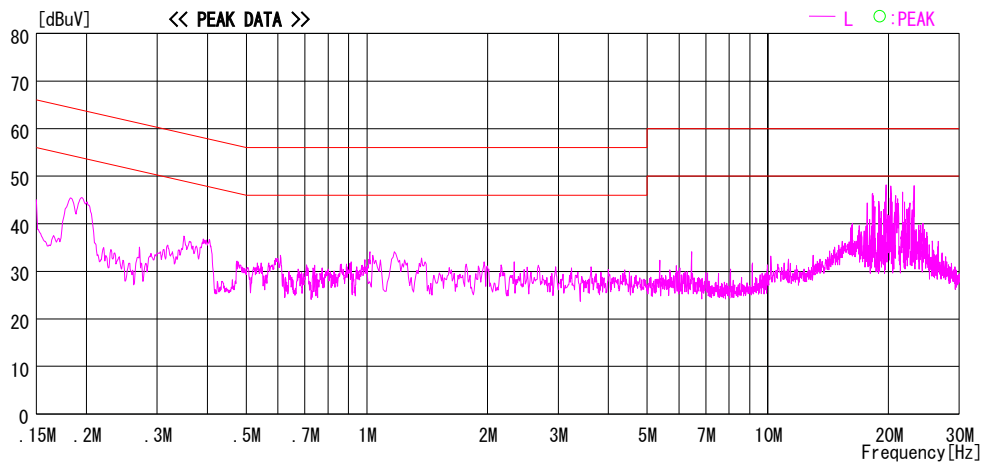
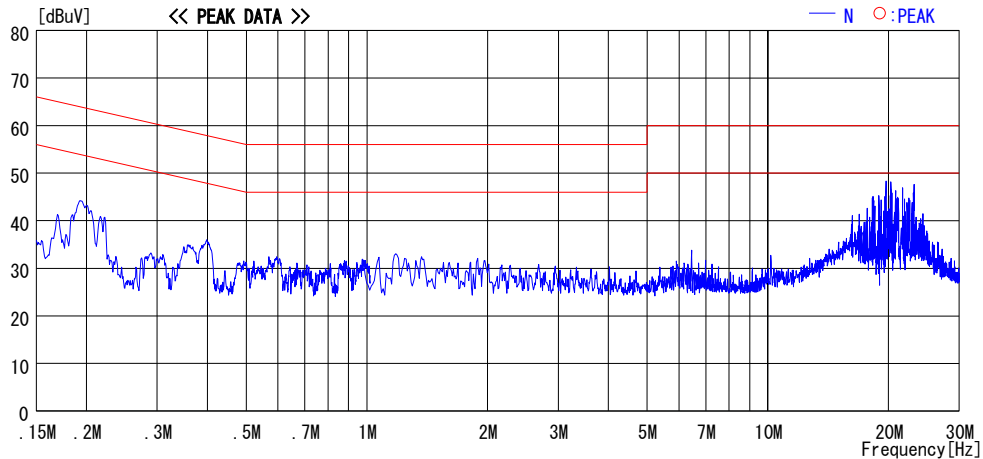


CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT[dBuV]=READING[dBuV]+C.F[dB] (LISN LOSS+CABLE LOSS)
Except for the above table: adequate margin data below the limits.

Radiated Emission below 30MHz (Fundamental and Spurious Emission)

DATA OF RADIATED EMISSION TEST

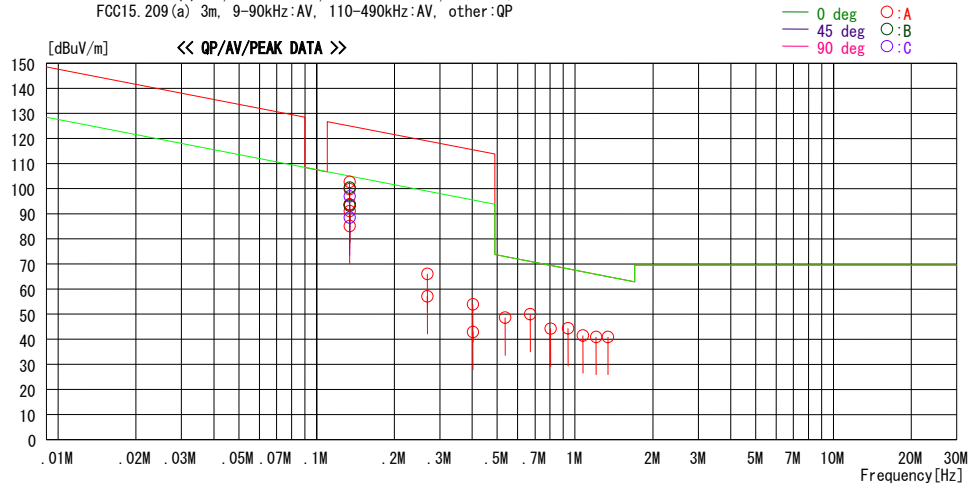
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2010/08/26

Report No. : 31AE0134-HO-01

Temp./ Humi. : 24deg. C. / 65%
Engineer : Hisayoshi Sato

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	109.0	PEAK	19.9	5.9	32.1	102.7	125.0	22.3	0	A	6 Worst
0.13420	100.0	AV	19.9	5.9	32.1	93.7	105.0	11.3	0	A	6 Worst
0.13420	106.8	PEAK	19.9	5.9	32.1	100.5	125.0	24.5	45	B	336
0.13420	99.5	AV	19.9	5.9	32.1	93.2	105.0	11.8	45	B	336
0.13420	103.2	PEAK	19.9	5.9	32.1	96.9	125.0	28.1	90	C	292
0.13420	94.7	AV	19.9	5.9	32.1	88.4	105.0	16.6	90	C	292
0.13420	106.1	PEAK	19.9	5.9	32.1	99.8	125.0	25.2	135	A	45
0.13420	97.3	AV	19.9	5.9	32.1	91.0	105.0	14.0	135	A	45
0.13420	100.1	PEAK	19.9	5.9	32.1	93.8	125.0	31.2	0	A	360 Loop:Hor
0.13420	91.4	AV	19.9	5.9	32.1	85.1	105.0	19.9	0	A	360 Loop:Hor
0.26840	72.6	PEAK	19.7	6.0	32.1	66.2	119.0	52.8	0	A	352
0.26840	63.6	AV	19.7	6.0	32.1	57.2	99.0	41.8	0	A	352
0.40260	60.3	PEAK	19.7	6.0	32.1	53.9	115.5	61.6	0	A	356
0.40260	49.3	AV	19.7	6.0	32.1	42.9	95.5	52.6	0	A	356
0.53680	55.1	QP	19.6	6.0	32.1	48.6	73.0	24.4	0	A	276
0.67100	56.6	QP	19.6	6.0	32.1	50.1	71.1	21.0	0	A	360
0.80520	50.6	QP	19.6	6.0	32.0	44.2	69.5	25.3	0	A	360
0.93940	50.8	QP	19.6	6.0	32.0	44.4	68.1	23.7	0	A	357
1.07360	48.0	QP	19.6	6.0	32.0	41.6	66.9	25.3	0	A	360
1.20780	47.3	QP	19.6	6.1	32.0	41.0	65.9	25.0	0	A	360
1.34200	47.2	QP	19.6	6.1	32.0	40.9	65.0	24.1	0	A	360

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.

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Radiated Emission below 30MHz (Fundamental and Spurious Emission)

DATA OF RADIATED EMISSION TEST

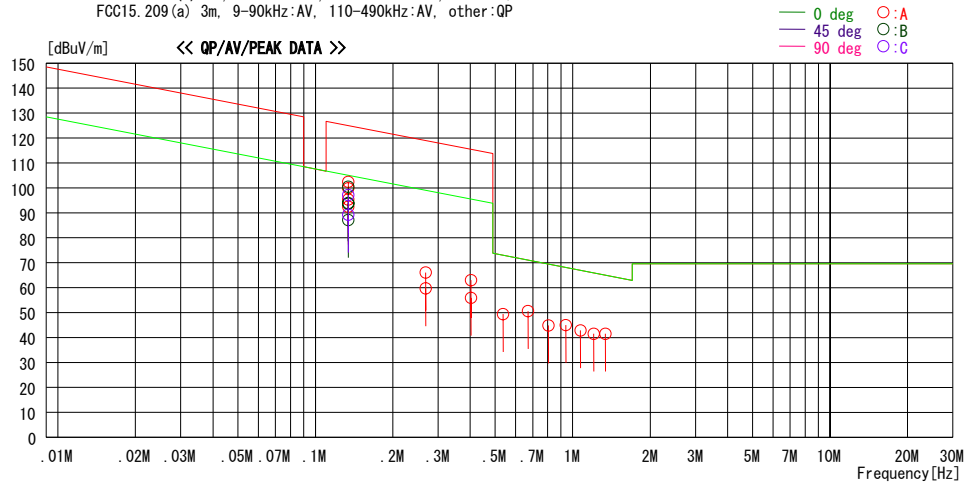
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Report No. : 31AE0134-HO-01

Temp./ Humi. : 24deg. C. / 65%
Engineer : Hisayoshi Sato

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



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	108.7	PEAK	19.9	5.9	32.1	102.4	125.0	22.6	0	A	6 Worst
0.13420	101.7	AV	19.9	5.9	32.1	95.4	105.0	9.6	0	A	6 Worst
0.13420	106.8	PEAK	19.9	5.9	32.1	100.5	125.0	24.5	45	B	336
0.13420	100.2	AV	19.9	5.9	32.1	93.9	105.0	11.1	45	B	336
0.13420	103.5	PEAK	19.9	5.9	32.1	97.2	125.0	27.8	90	C	281
0.13420	106.1	PEAK	19.9	5.9	32.1	99.8	125.0	25.2	135	A	45
0.13420	98.8	AV	19.9	5.9	32.1	92.5	105.0	12.5	135	A	45
0.13420	100.0	PEAK	19.9	5.9	32.1	93.7	125.0	31.3	0	B	360 Loop: Hor
0.13420	93.5	AV	19.9	5.9	32.1	87.2	105.0	17.8	0	B	360 Loop: Hor
0.13420	95.6	AV	19.9	5.9	32.1	89.3	105.0	15.7	90	C	281
0.26840	72.4	PEAK	19.7	6.0	32.1	66.0	119.0	53.0	0	A	352
0.26840	66.1	AV	19.7	6.0	32.1	59.7	99.0	39.3	0	A	352
0.40260	69.4	PEAK	19.7	6.0	32.1	63.0	115.5	52.5	0	A	356
0.40260	62.3	AV	19.7	6.0	32.1	55.9	95.5	39.6	0	A	356
0.53680	55.8	QP	19.6	6.0	32.1	49.3	73.0	23.7	0	A	276
0.67100	57.1	QP	19.6	6.0	32.1	50.6	71.1	20.5	0	A	360
0.80520	51.3	QP	19.6	6.0	32.0	44.9	69.5	24.6	0	A	77
0.93940	51.4	QP	19.6	6.0	32.0	45.0	68.1	23.1	0	A	360
1.07360	49.2	QP	19.6	6.0	32.0	42.8	66.9	24.1	0	A	358
1.20780	47.8	QP	19.6	6.1	32.0	41.5	65.9	24.4	0	A	358
1.34200	47.8	QP	19.6	6.1	32.0	41.5	65.0	23.5	0	A	358

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)

Radiated Emission above 30MHz (Spurious Emission)

DATA OF RADIATED EMISSION TEST

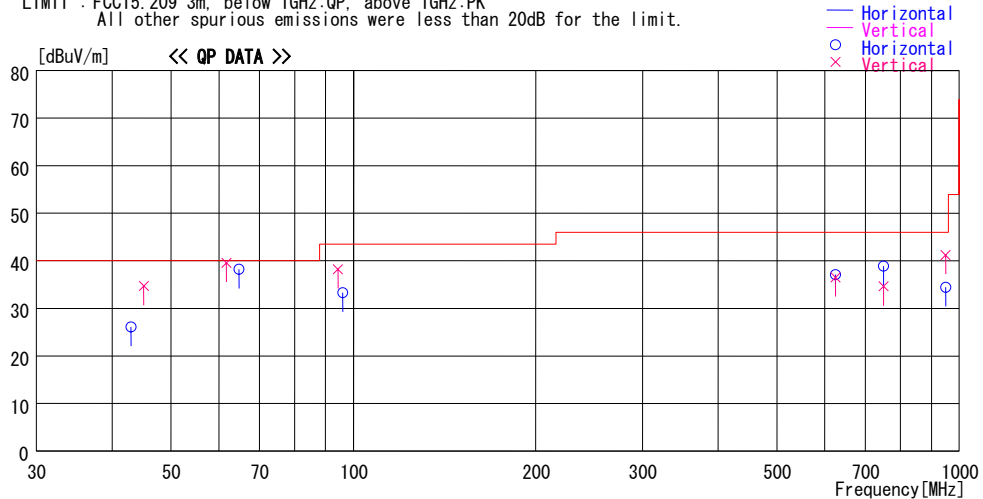
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Date : 2010/08/26

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:Y)

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]							
42.954	37.3	QP	13.6	-24.8	26.1	115	386	Hori.	40.0	13.9	
45.102	46.6	QP	12.8	-24.7	34.7	353	100	Vert.	40.0	5.3	
61.740	56.3	QP	7.8	-24.5	39.6	342	100	Vert.	40.0	0.4	
64.716	55.4	QP	7.3	-24.5	38.2	324	315	Hori.	40.0	1.8	
94.367	53.2	QP	9.1	-24.1	38.2	80	100	Vert.	43.5	5.3	
96.031	48.0	QP	9.4	-24.1	33.3	73	164	Hori.	43.5	10.2	
624.992	37.0	QP	20.6	-20.5	37.1	140	100	Hori.	46.0	8.9	
625.002	36.4	QP	20.6	-20.5	36.5	44	100	Vert.	46.0	9.5	
749.995	31.8	QP	22.6	-19.8	34.6	342	130	Vert.	46.0	11.4	
749.998	36.1	QP	22.6	-19.8	38.9	154	100	Hori.	46.0	7.1	
949.994	34.0	QP	25.3	-18.1	41.2	4	111	Vert.	46.0	4.8	
949.995	27.2	QP	25.3	-18.1	34.4	6	100	Hori.	46.0	11.6	

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 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

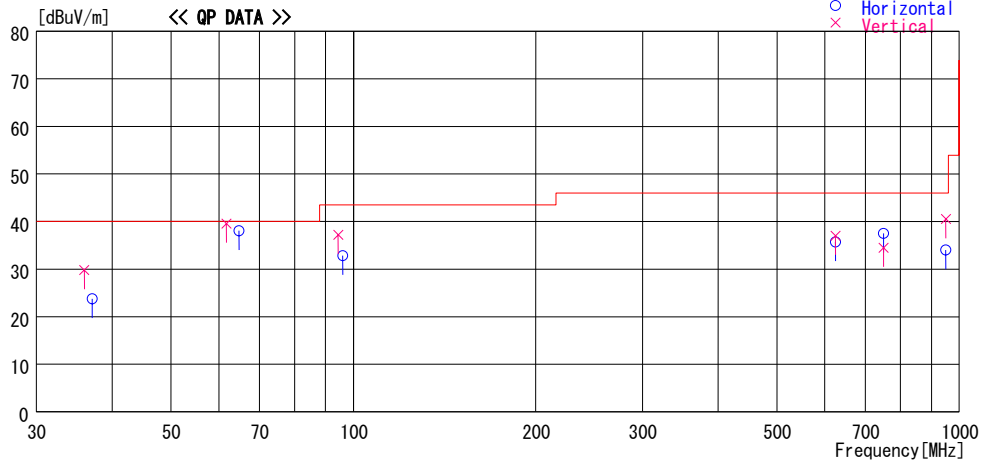
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Report No. : 31AE0134-HO-01

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

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

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	Loss &	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit	Margin	Comment
			Factor [dB/m]	Gain [dB]					[dBuV/m]	[dB]	
37.046	32.9	QP	15.8	-24.9	23.8	6	188	Hori.	40.0	16.2	
35.983	38.5	QP	16.2	-24.9	29.8	83	100	Vert.	40.0	10.2	
61.740	56.3	QP	7.8	-24.5	39.6	342	100	Vert.	40.0	0.4	
64.716	55.3	QP	7.3	-24.5	38.1	324	315	Hori.	40.0	1.9	
96.033	47.5	QP	9.4	-24.1	32.8	80	182	Hori.	43.5	10.7	
94.401	52.2	QP	9.1	-24.1	37.2	78	100	Vert.	43.5	6.3	
624.994	35.6	QP	20.6	-20.5	35.7	301	100	Hori.	46.0	10.3	
625.001	36.9	QP	20.6	-20.5	37.0	42	100	Vert.	46.0	9.0	
749.999	34.7	QP	22.6	-19.8	37.5	306	100	Hori.	46.0	8.5	
749.997	31.7	QP	22.6	-19.8	34.5	342	130	Vert.	46.0	11.5	
949.998	26.8	QP	25.3	-18.1	34.0	351	100	Hori.	46.0	12.0	
949.996	33.3	QP	25.3	-18.1	40.5	6	112	Vert.	46.0	5.5	

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 %

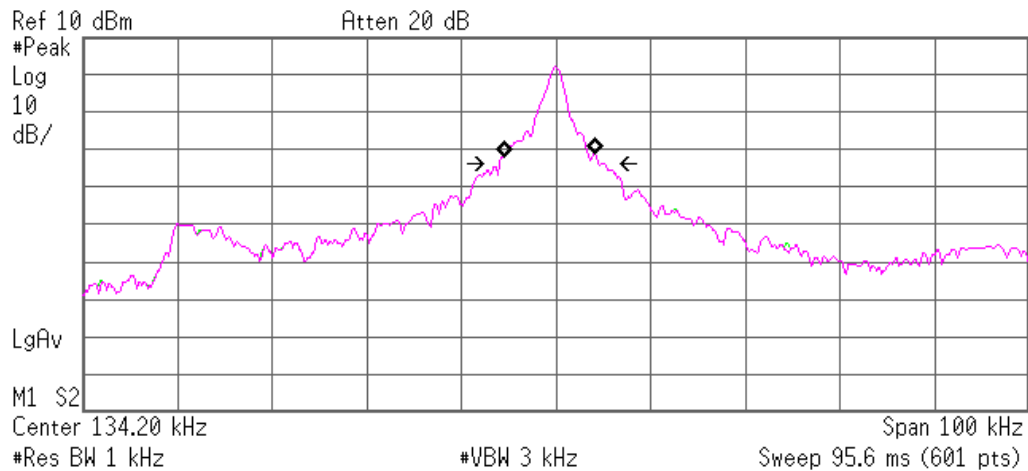
Engineer : Satofumi Matsuyama

MODE : Communication
: With Tag

FREQ	-26dB Bandwidth	-99% Occupied Bandwidth
[kHz]	[kHz]	[kHz]
134.2	11.295	9.551

Agilent

R T



Occupied Bandwidth
9.5510 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -686.341 Hz
x dB Bandwidth 11.295 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 %

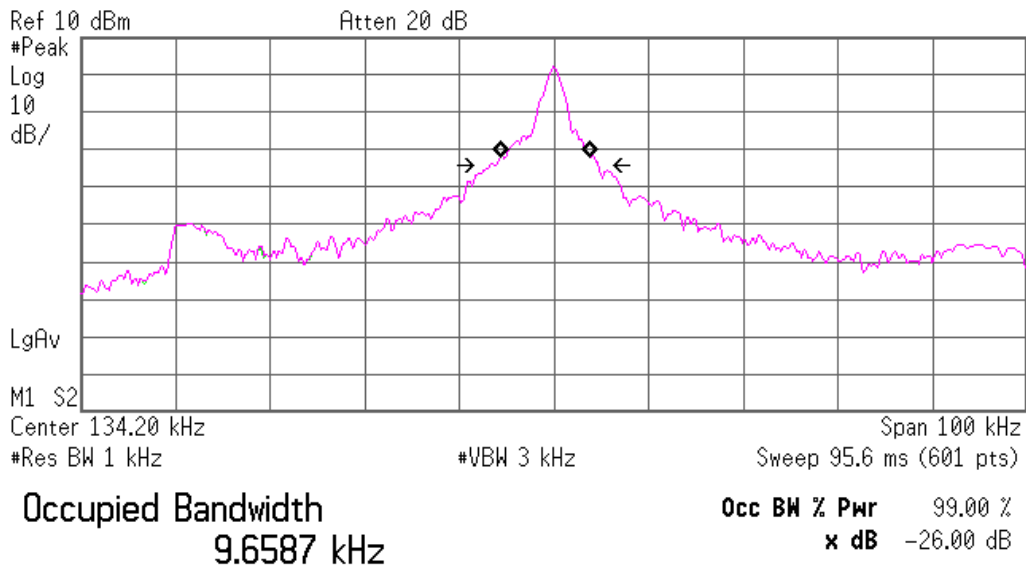
Engineer : Satofumi Matsuyama

MODE : Communication
: Without Tag

FREQ	-26dB Bandwidth	-99% Occupied Bandwidth
[kHz]	[kHz]	[kHz]
134.2	11.532	9.659

Agilent

R T



Transmit Freq Error -918.494 Hz
x dB Bandwidth 11.532 kHz

UL Japan, Inc.

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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

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