

APPENDIX 2: Data of EMI test

Radiated Emission below 30MHz (Fundamental and Spurious Emission)

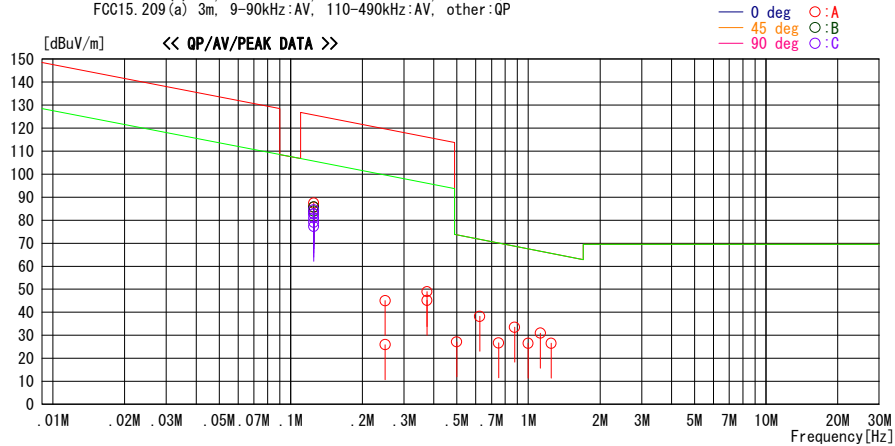
DATA OF RADIATED EMISSION TEST

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

Report No. : 31BE0219-HO-12
Temp. / Humi. : 21deg. C. /31%RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 125kHz 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	93.5	PEAK	20.1	5.9	32.1	87.4	125.7	38.3	0	A	7 Worst
0.12500	91.9	PEAK	20.1	5.9	32.1	85.8	125.7	39.9	45	B	336
0.12500	88.9	PEAK	20.1	5.9	32.1	82.8	125.7	42.9	90	C	281
0.12500	90.7	PEAK	20.1	5.9	32.1	84.6	125.7	41.1	135	C	20
0.12500	87.1	AV	20.1	5.9	32.1	81.0	105.7	24.7	90	C	281
0.12500	88.9	AV	20.1	5.9	32.1	82.8	105.7	22.9	135	C	20
0.12500	90.0	AV	20.1	5.9	32.1	83.9	105.7	21.8	45	B	336
0.12500	91.7	AV	20.1	5.9	32.1	85.6	105.7	20.1	0	A	7 Worst
0.12500	85.2	PEAK	20.1	5.9	32.1	79.1	125.7	46.6	0	C	359 Hori
0.12500	83.4	AV	20.1	5.9	32.1	77.3	105.7	28.4	0	C	359 Hori
0.25000	19.0	PEAK	20.0	6.0	0.0	45.0	119.7	74.7	0	A	353
0.25000	0.0	AV	20.0	6.0	0.0	26.0	99.7	73.7	0	A	353
0.37500	23.0	PEAK	19.9	6.0	0.0	48.9	116.1	67.2	0	A	7
0.37500	19.3	AV	19.9	6.0	0.0	45.2	96.1	50.9	0	A	7
0.50000	1.3	QP	19.9	6.0	0.0	27.2	73.6	46.4	0	A	8
0.62500	12.3	QP	19.9	6.0	0.0	38.2	71.7	33.5	0	A	6
0.75000	0.8	QP	19.9	6.0	0.0	26.7	70.1	43.4	0	A	10
0.87500	7.6	QP	19.9	6.0	0.0	33.5	68.7	35.2	0	A	352
1.00000	0.7	QP	19.9	6.0	0.0	26.6	67.6	41.0	0	A	11
1.12500	5.0	QP	19.9	6.1	0.0	31.0	66.5	35.5	0	A	6
1.25000	0.6	QP	19.9	6.1	0.0	26.6	65.6	39.0	0	A	7

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

Radiated Emission above 30MHz (Spurious Emission)

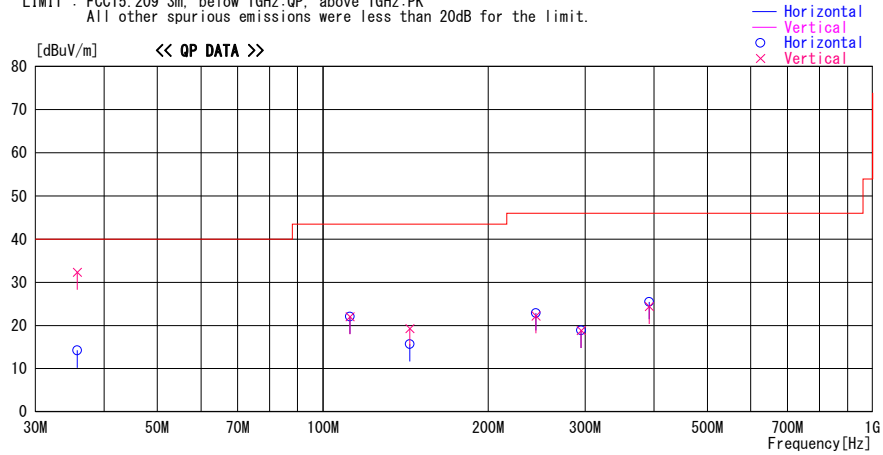
DATA OF RADIATED EMISSION TEST

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

Report No. : 31BE0219-HO-12
Temp. / Humi. : 23deg. C. / 30%RH
Engineer : Keisuke Kawamura

Mode / Remarks : Tx 125kHz Worst-Axis (ECU Hori:X,Vert:X , Antenna 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	Loss&	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]							
35.756	22.9	QP	16.2	-24.9	14.2	0	300	Hori.	40.0	25.8	
35.756	41.0	QP	16.2	-24.9	32.3	252	100	Vert.	40.0	7.7	
112.021	34.0	QP	12.0	-23.9	22.1	315	285	Hori.	43.5	21.4	
112.021	33.9	QP	12.0	-23.9	22.0	45	100	Vert.	43.5	21.5	
144.025	24.4	QP	14.8	-23.5	15.7	237	231	Hori.	43.5	27.8	
144.025	28.0	QP	14.8	-23.5	19.3	264	100	Vert.	43.5	24.2	
244.049	27.5	QP	17.3	-22.6	22.2	216	100	Vert.	46.0	23.8	
244.049	28.2	QP	17.3	-22.6	22.9	38	197	Hori.	46.0	23.1	
295.085	21.8	QP	19.3	-22.3	18.8	0	100	Vert.	46.0	27.2	
295.085	21.8	QP	19.3	-22.3	18.8	0	300	Hori.	46.0	27.2	
392.074	29.7	QP	17.4	-21.6	25.5	292	100	Hori.	46.0	20.5	
392.074	28.6	QP	17.4	-21.6	24.4	257	107	Vert.	46.0	21.6	

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.

-26dB Bandwidth and 99% Occupied Bandwidth

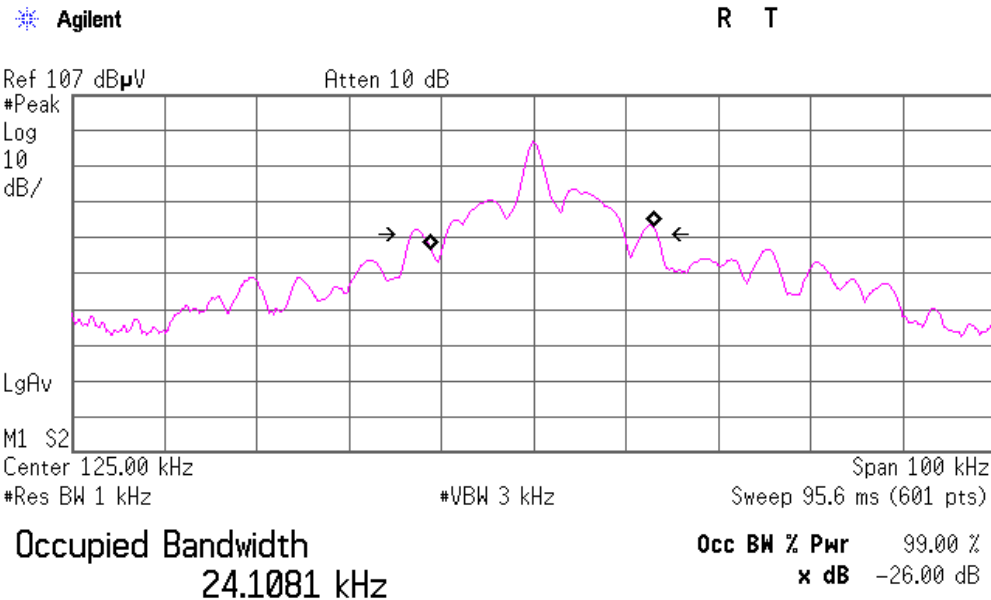
UL Japan, Inc.
Head Office EMC Lab. No.4 Semi Anechoic Chamber

REPORT NO : 31BE0219-HO-12

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

MODE : Tx

FREQ	-26dB Bandwidth	99% Occupied Bandwidth
[kHz]	[kHz]	[kHz]
125.0	26.651	24.108



Transmit Freq Error 946.620 Hz
x dB Bandwidth 26.651 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	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: Spurious emission

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