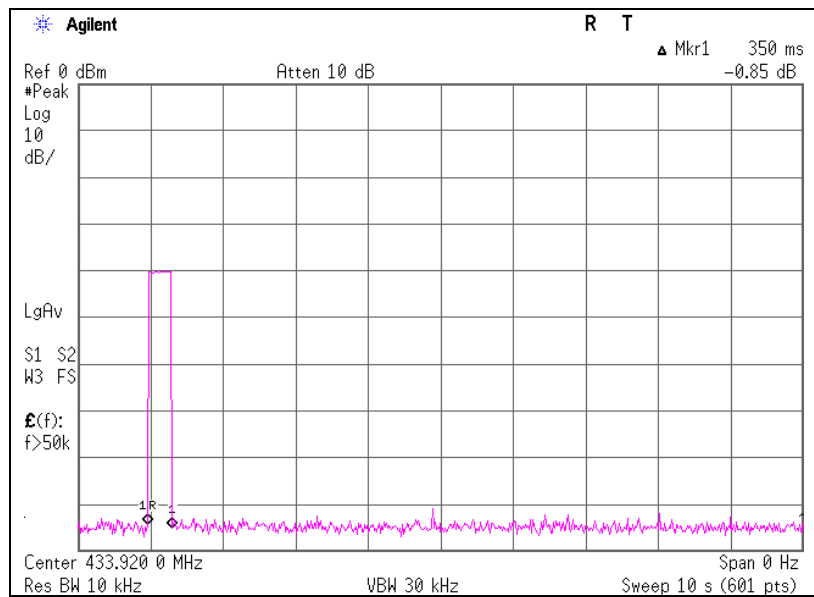


APPENDIX 2: Data of EMI test

Automatically deactivate

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
 Report No. 29KE0211-HO-03-A
 Date 10/09/2009
 Temperature/ Humidity 23 deg.C./ 53%
 Engineer Tomohisa Nakagawa
 Mode Normal use mode

Time of Transmitting [sec]	Limit [sec]	Result
0.35	5.00	Pass



Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 29KE0211-HO-03-A
Date : 10/09/2009
Temperature/ Humidity : 23 deg.C./ 53%
Engineer : Tomohisa Nakagawa
Mode : Transmitting mode

PK

Frequency [MHz]	Detector	Reading [dBuV]		Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]		Remark Inside or Outside of Restricted Bands
		Hor	Ver					Hor	Ver		Hor	Ver	
433.920	PK	79.9	79.1	18.1	9.5	28.5	-	79.0	78.2	100.8	21.8	22.6	Carrier
867.840	PK	33.7	33.5	22.7	11.1	28.1	-	39.4	39.2	80.8	41.4	41.6	Outside
1301.760	PK	48.4	49.0	25.2	2.1	33.3	-	42.4	43.0	73.9	31.5	30.9	Inside
1735.680	PK	52.7	52.5	25.9	2.3	32.7	-	48.2	48.0	80.8	32.6	32.8	Outside
2169.600	PK	48.8	47.0	26.6	2.5	32.4	-	45.5	43.7	80.8	35.3	37.1	Outside
2603.520	PK	43.8	43.3	27.6	2.7	32.4	-	41.7	41.2	80.8	39.1	39.6	Outside
3037.440	PK	45.9	45.0	28.5	3.0	32.2	-	45.2	44.3	80.8	35.6	36.5	Outside
3471.360	PK	44.1	42.4	28.7	3.2	31.9	-	44.1	42.4	80.8	36.7	38.4	Outside
3905.280	PK	42.8	42.8	29.5	3.3	31.7	-	43.9	43.9	73.9	30.0	30.0	Inside
4339.200	PK	41.7	41.9	30.4	3.5	31.5	-	44.1	44.3	73.9	29.8	29.6	Inside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

PK with Duty factor

Frequency [MHz]	Detector	Reading [dBuV]		Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]		Limit [dBuV/m]	Margin [dB]		Remark
		Hor	Ver					Hor	Ver		Hor	Ver	
433.920	PK	79.9	79.1	18.1	9.5	28.5	-1.4	77.6	76.8	80.8	3.2	4.0	Carrier
867.840	PK	33.7	33.5	22.7	11.1	28.1	-1.4	38.0	37.8	60.8	22.8	23.0	Outside
1301.760	PK	48.4	49.0	25.2	2.1	33.3	-1.4	41.0	41.6	53.9	12.9	12.3	Inside
1735.680	PK	52.7	52.5	25.9	2.3	32.7	-1.4	46.8	46.6	60.8	14.0	14.2	Outside
2169.600	PK	48.8	47.0	26.6	2.5	32.4	-1.4	44.1	42.3	60.8	16.7	18.5	Outside
2603.520	PK	43.8	43.3	27.6	2.7	32.4	-1.4	40.3	39.8	60.8	20.5	21.0	Outside
3037.440	PK	45.9	45.0	28.5	3.0	32.2	-1.4	43.8	42.9	60.8	17.0	17.9	Outside
3471.360	PK	44.1	42.4	28.7	3.2	31.9	-1.4	42.7	41.0	60.8	18.1	19.8	Outside
3905.280	PK	42.8	42.8	29.5	3.3	31.7	-1.4	42.5	42.5	53.9	11.4	11.4	Inside
4339.200	PK	41.7	41.9	30.4	3.5	31.5	-1.4	42.7	42.9	53.9	11.2	11.0	Inside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier) + Duty factor (Refer to Duty factor data sheet)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

* The test above 1GHz was performed with PK detect. Average emission measurements were calculated with PK detect and Duty cycle factor.

* Duty Factor was calculated with the assumption of the worst condition in 100msec.

* All the measured noise was pulse emission.

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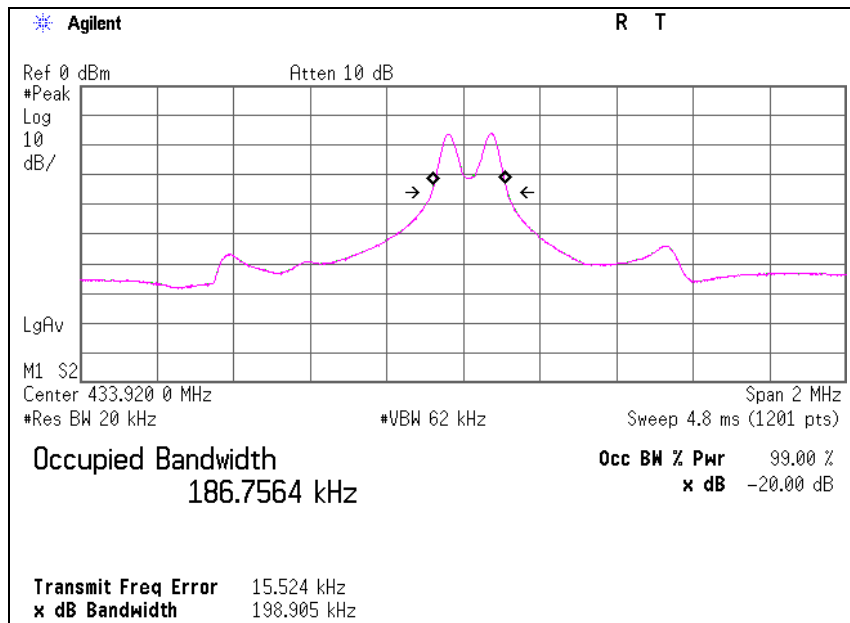
-20dB and 99% Occupied Bandwidth

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
 Report No. : 29KE0211-HO-03-A
 Date : 10/09/2009
 Temperature/ Humidity : 23 deg.C./ 53%
 Engineer : Tomohisa Nakagawa
 Mode : Transmitting mode

Bandwidth Limit : Fundamental Frequency $433.92 \text{ MHz} \times 0.25\% = 1084.80 \text{ kHz}$

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
198.91	1084.80	Pass

99 % Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
186.76	1084.80	Pass



Duty Cycle

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	29KE0211-HO-03-A
Date	10/09/2009
Temperature/ Humidity	23 deg.C./ 53%
Engineer	Tomohisa Nakagawa
Mode	Transmitting mode

ON time(One pulse)		ON time(in 20ms)	ON time(in 100ms)
Times	[ms]	[ms]	[ms]
49	0.349	17.0814	85.407

*1)ON time(in 100ms) = Times * ON time(One pulse)

*2)The train of pulses was exceeding 100msec, and that sampled 100msec was the worst case against the pulse train.

(Total)

ON time [ms]	Cycle [ms]	Duty (On time/Cycle)	Duty [dB]
85.41	100.00	0.85	-1.4

*3)ON time = ON time (in 100ms)

*4)Duty = $20\log_{10}(\text{ON time/Cycle})$

UL Japan, Inc.

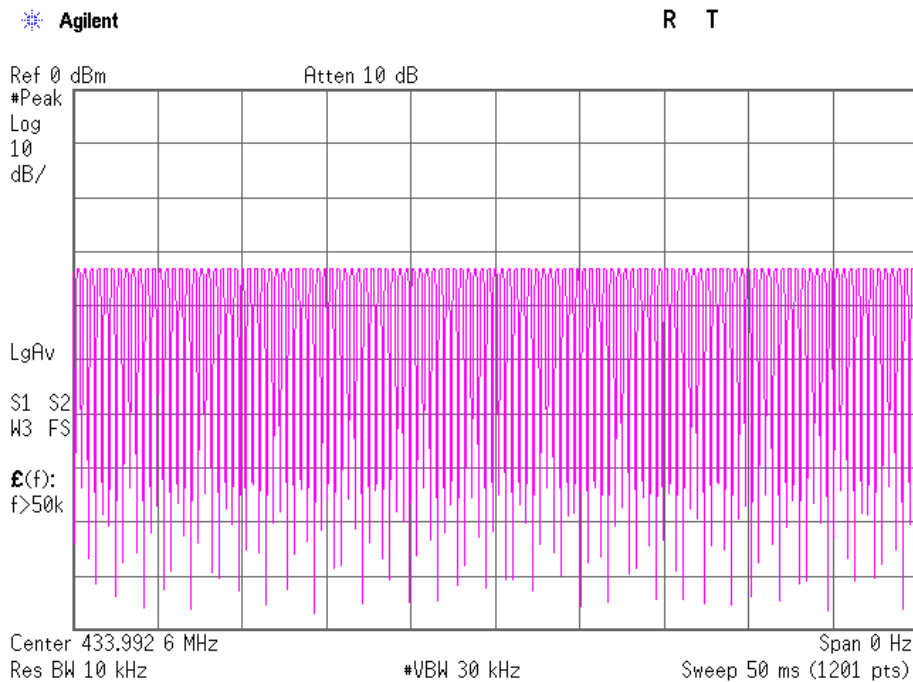
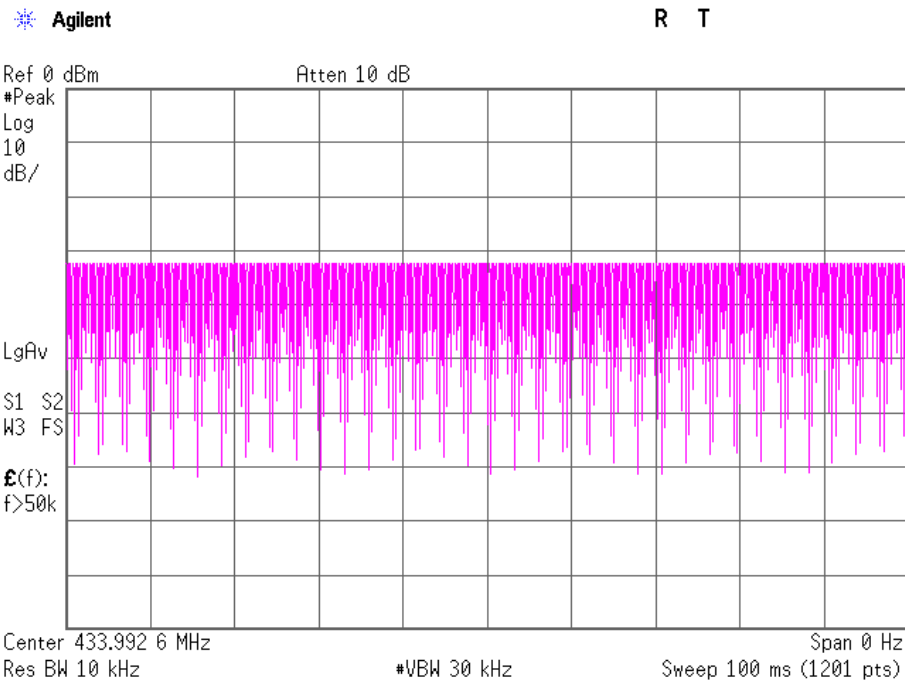
Head Office EMC Lab.

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

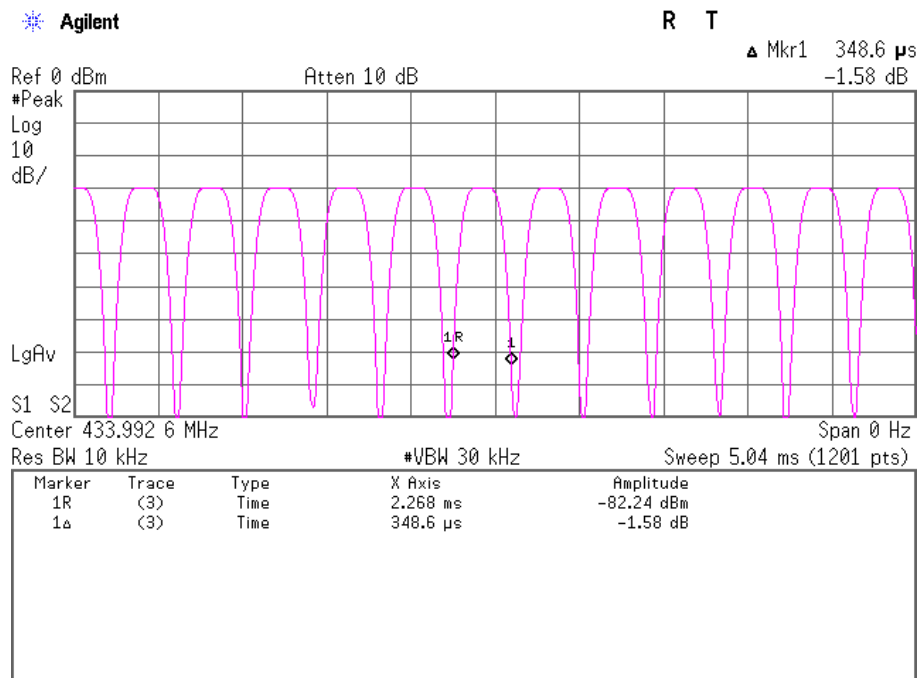
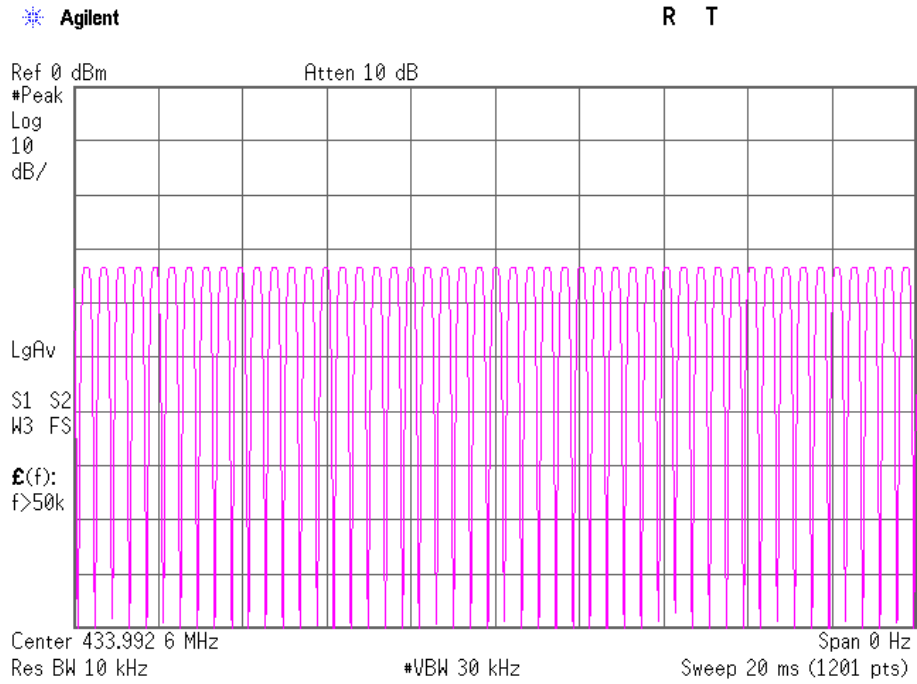
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Duty Cycle



Duty Cycle



Receiver Spurious Emission

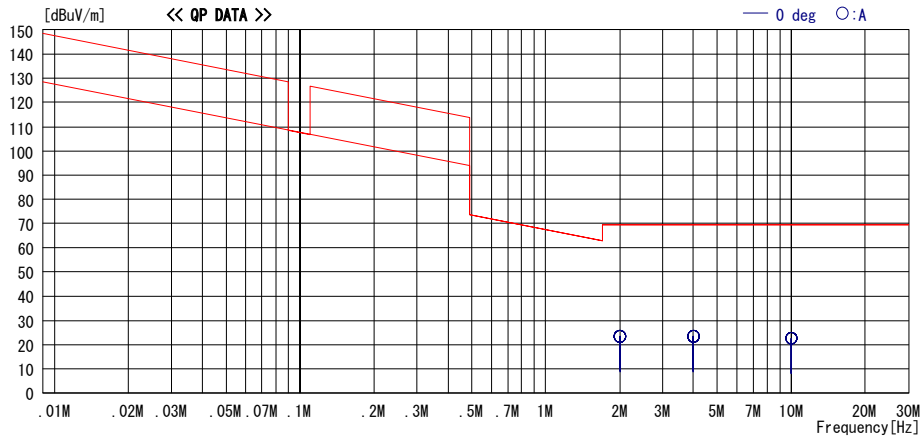
DATA OF RADIATED EMISSION

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
 Date : 2009/10/09

Report No. : 29KE0211-HO-03-A
 Power : DC 3.0 V
 Operator : Tomohisa Nakagawa

Mode / Remarks : LF Receive mode

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]	
2.00000	32.6	QP	19.4	0.4	28.7	23.7	69.5	45.8	0	A	0
2.00000	32.6	QP	19.4	0.4	28.7	23.7	69.5	45.8	45	A	0
2.00000	32.6	QP	19.4	0.4	28.7	23.7	69.5	45.8	90	A	0
2.00000	32.6	QP	19.4	0.4	28.7	23.7	69.5	45.8	135	A	0
2.00000	32.5	QP	19.4	0.4	28.7	23.6	69.5	45.9	0	A	0
4.00000	32.2	QP	19.7	0.6	28.8	23.7	69.5	45.8	0	A	0
4.00000	32.2	QP	19.7	0.6	28.8	23.7	69.5	45.8	45	A	0
4.00000	32.2	QP	19.7	0.6	28.8	23.7	69.5	45.8	90	A	0
4.00000	32.1	QP	19.7	0.6	28.8	23.6	69.5	45.9	135	A	0
4.00000	32.2	QP	19.7	0.6	28.8	23.7	69.5	45.8	0	A	0
10.00000	30.9	QP	19.7	0.9	28.8	22.7	69.5	46.8	0	A	0
10.00000	30.9	QP	19.7	0.9	28.8	22.7	69.5	46.8	45	A	0
10.00000	30.9	QP	19.7	0.9	28.8	22.7	69.5	46.8	90	A	0
10.00000	30.9	QP	19.7	0.9	28.8	22.7	69.5	46.8	135	A	0
10.00000	30.9	QP	19.7	0.9	28.8	22.7	69.5	46.8	0	A	0

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

Receiver Spurious Emission

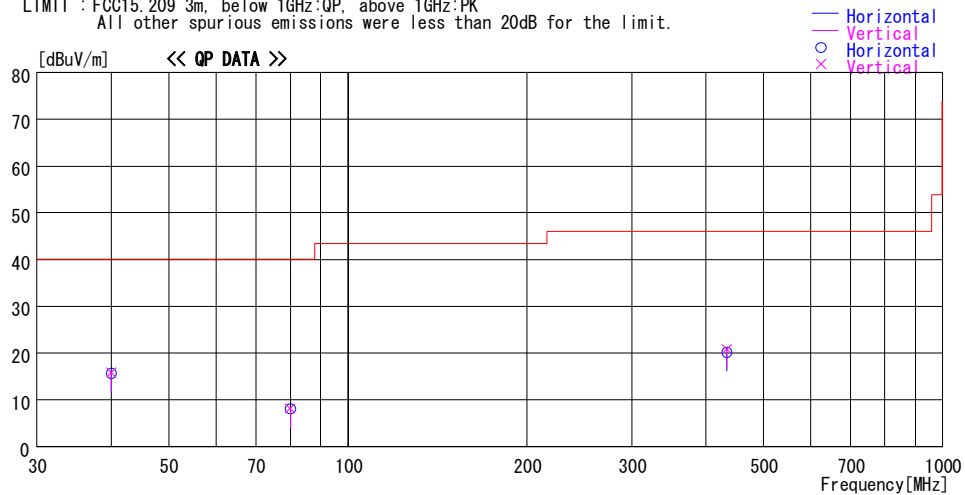
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2009/10/09

Report No. : 29KE0211-HO-03-A
Power : DC 3.0 V
Engineer : Tomohisa Nakagawa

Mode / Remarks : LF Receive mode

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]							
40.000	22.5	QP	15.0	-21.8	15.7	0	100	Hori.	40.0	24.3	NS
40.000	22.6	QP	15.0	-21.8	15.8	0	100	Vert.	40.0	24.2	NS
80.000	22.3	QP	7.0	-21.2	8.1	0	100	Hori.	40.0	31.9	NS
80.000	22.3	QP	7.0	-21.2	8.1	0	100	Vert.	40.0	31.9	NS
433.935	21.7	QP	18.1	-19.0	20.8	0	100	Vert.	46.0	25.2	NS
433.935	21.0	QP	18.1	-19.0	20.1	0	100	Hori.	46.0	25.9	NS

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)

NS: No Signal detected

APPENDIX 3:Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2009/08/17 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2009/02/05 * 12
MJM-05	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2009/08/25 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2009/04/14 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	836553/009	RE	2008/11/14 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	RE	2009/02/16 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2009/06/22 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2009/10/05 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2009/10/05 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2009/02/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2008/11/14 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2009/09/02 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2009/01/31 * 12
MCC-47	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	295123(5m) / 287573(1m)	RE	2008/11/27 * 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, 99% Occupied Bandwidth, -20dB bandwidth , Automatically deactivate and Duty cycle tests

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