

APPENDIX 2: Data of EMI test

Conducted Emission

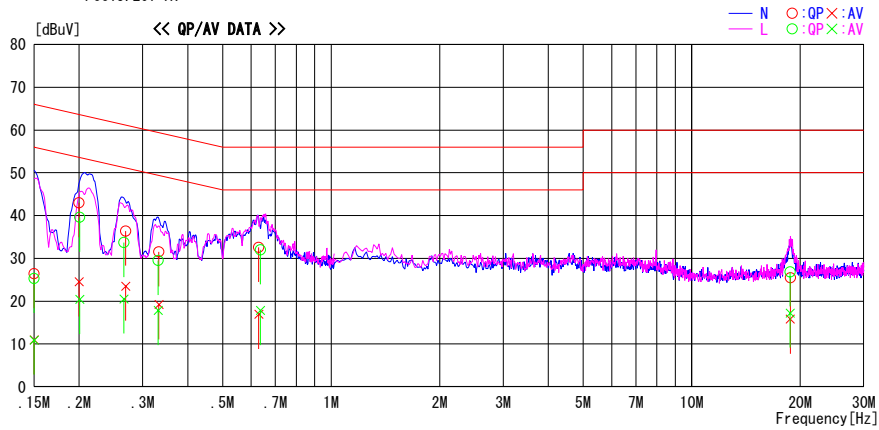
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2010/06/16

Report No. : 30CE0008-YK-01
Temp./Humi. : 24deg. C / 69%
Engineer : Katsunori Okai

Mode / Remarks : Tx 916.2204MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

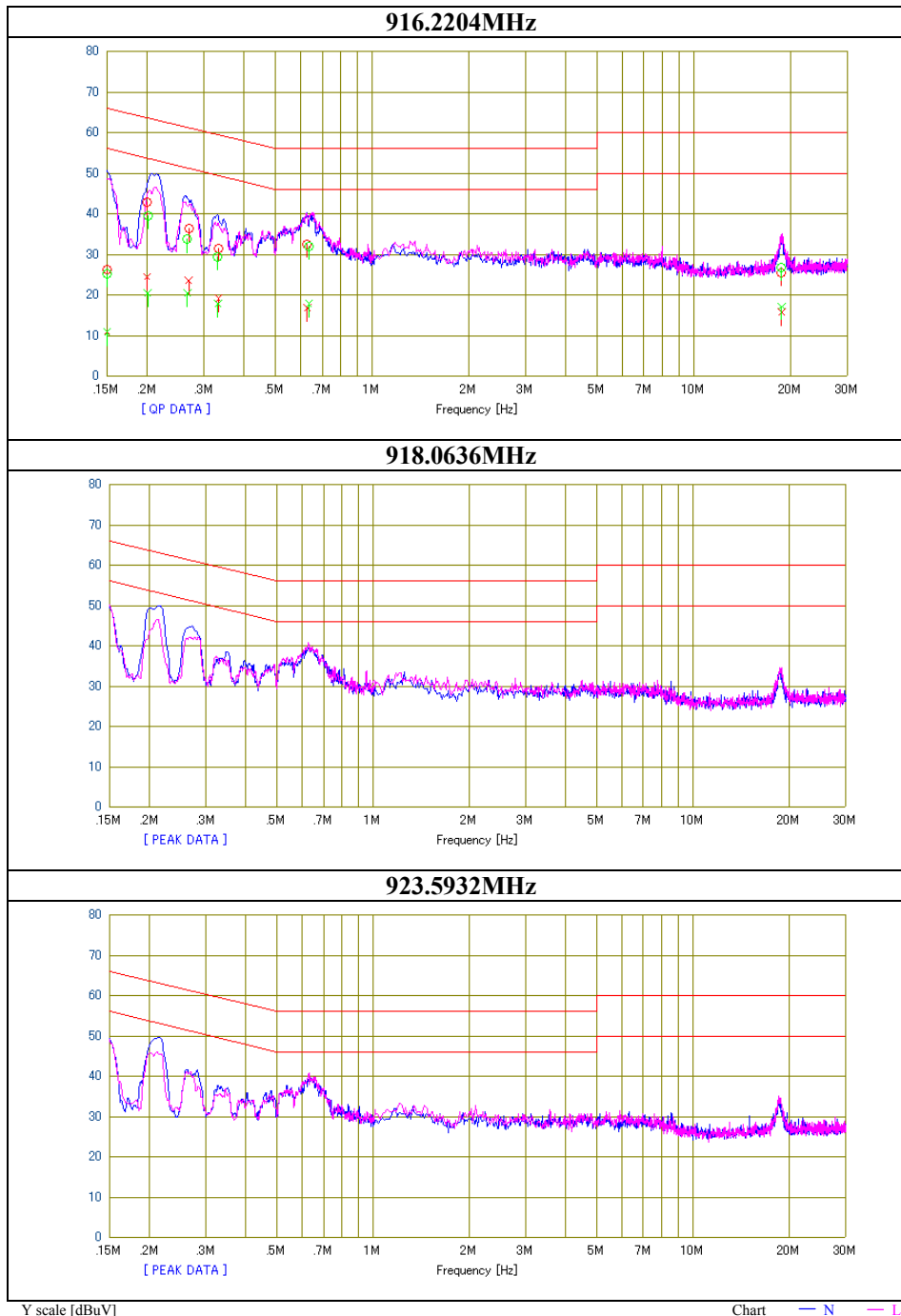


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	13.1	-2.3	13.3	26.4	11.0	66.0	56.0	39.6	45.0	N	
0.19992	29.7	11.2	13.3	43.0	24.5	63.6	53.6	20.6	29.1	N	
0.26931	23.1	10.2	13.3	36.4	23.5	61.1	51.1	24.7	27.6	N	
0.33298	18.2	5.9	13.3	31.5	19.2	59.4	49.4	27.9	30.2	N	
0.62943	19.2	3.5	13.4	32.6	16.9	56.0	46.0	23.4	29.1	N	
18.76805	10.4	0.7	15.1	25.5	15.8	60.0	50.0	34.5	34.2	N	
0.15000	12.0	-2.4	13.3	25.3	10.9	66.0	56.0	40.7	45.1	L	
0.20081	26.3	7.1	13.3	39.6	20.4	63.6	53.6	24.0	33.2	L	
0.26631	20.4	7.2	13.3	33.7	20.5	61.2	51.2	27.5	30.7	L	
0.33125	16.2	4.5	13.3	29.5	17.8	59.4	49.4	29.9	31.6	L	
0.63644	18.6	4.4	13.4	32.0	17.8	56.0	46.0	24.0	28.2	L	
18.74805	11.7	2.1	15.1	26.8	17.2	60.0	50.0	33.2	32.8	L	

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.

Conducted Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	30CE0008-YK-01
Date	06/16/2010
Temperature/ Humidity	24 deg. C. / 69%
Engineer	Katsunori Okai
Mode	Transmitting mode



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

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 30CE0008-YK-01
Date 06/15/2010
Temperature/ Humidity 23 deg. C. / 67% 22 deg. C. / 60%
Engineer Katsunori Okai Hiroyuki Furutaka
(Above 1GHz) (Below 1GHz)
Mode Transmitting mode, 916.2204MHz

QP or 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]	
		Hor	Ver					Hor	Ver		Hor	Ver
39.39	QP	22.9	36	15.2	6.8	28.7	-	16.2	29.3	40.0	23.8	10.7
50.96	QP	22.9	32.8	11	7	28.7	-	12.2	22.1	40.0	27.8	17.9
404.234	QP	21.4	21.9	17.5	9.4	28.3	-	20.0	20.5	46.0	26.0	25.5
536.832	QP	22.4	22.2	18.6	9.9	28.8	-	22.1	21.9	46.0	23.9	24.1
700.700	QP	22.1	21.9	20.4	10.5	28.6	-	24.4	24.2	46.0	21.6	21.8
902.000	QP	21.6	21.5	22.5	11.2	28	-	27.3	27.2	46.0	18.7	18.8
916.220	QP	78.2	87.7	22.6	11.3	27.9	-	84.2	93.7	93.9	9.7	0.2
1832.441	PK	54.0	57.8	26.3	3.0	32.5	-	50.8	54.6	73.9	23.1	19.3
2748.661	PK	45.6	46.1	27.3	3.4	32.3	-	44.0	44.5	73.9	29.9	29.4
3664.882	PK	43.8	43.3	28.3	3.9	31.8	-	44.2	43.7	73.9	29.7	30.2
4581.102	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
5497.322	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
6413.543	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
7329.763	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
8245.984	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
9162.204	PK	NS	NS	-	-	-	-	-	-	73.9	-	-

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]	
		Hor	Ver					Hor	Ver		Hor	Ver
1832.441	PK	54.0	57.8	26.3	3.0	32.5	-2.9	47.9	51.7	53.9	6.0	2.2
2748.661	PK	45.6	46.1	27.3	3.4	32.3	-2.9	41.1	41.6	53.9	12.8	12.3
3664.882	PK	43.8	43.3	28.3	3.9	31.8	-2.9	41.3	40.8	53.9	12.6	13.1
4581.102	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
5497.322	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
6413.543	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
7329.763	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
8245.984	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
9162.204	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-

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).

*NS: No Signal

- * 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.
- * The noise measured with PK detect was pulse emission.

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

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 30CE0008-YK-01
Date : 06/15/2010
Temperature/ Humidity : 23 deg. C./ 67% 22 deg. C./ 60%
Engineer : Katsunori Okai Hiroyuki Furutaka
(Above 1GHz) (Below 1GHz)
Mode : Transmitting mode, 923.5932MHz

QP or 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]	
		Hor	Ver					Hor	Ver		Hor	Ver
37.890	QP	24.3	36.9	15.7	6.8	28.7	-	18.1	30.7	40.0	21.9	9.3
50.650	QP	24.3	34.1	11.1	7.0	28.7	-	13.7	23.5	40.0	26.3	16.5
536.832	QP	22.4	22.3	18.6	9.9	28.8	-	22.1	22.0	46.0	23.9	24.0
700.700	QP	22.4	22.2	20.4	10.5	28.6	-	24.7	24.5	46.0	21.3	21.5
928.000	QP	21.7	21.5	22.7	11.3	27.9	-	27.8	27.6	46.0	18.2	18.4
960.000	QP	21.4	21.5	22.9	11.4	27.8	-	27.9	28.0	46.0	18.1	18.0
923.593	QP	79.3	86.4	22.6	11.3	27.9	-	85.3	92.4	93.9	8.6	1.5
1847.186	PK	54.5	58.6	26.3	3.0	32.5	-	51.3	55.4	73.9	22.6	18.5
2770.780	PK	45.9	46.7	27.3	3.4	32.3	-	44.3	45.1	73.9	29.6	28.8
3694.373	PK	44.6	43.5	28.3	3.9	31.8	-	45.0	43.9	73.9	28.9	30.0
4617.966	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
5541.559	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
6465.152	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
7388.746	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
8312.339	PK	NS	NS	-	-	-	-	-	-	73.9	-	-
9235.932	PK	NS	NS	-	-	-	-	-	-	73.9	-	-

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]	
		Hor	Ver					Hor	Ver		Hor	Ver
1847.186	PK	54.5	58.6	26.3	3.0	32.5	-2.9	48.4	52.5	53.9	5.5	1.4
2770.780	PK	45.9	46.7	27.3	3.4	32.3	-2.9	41.4	42.2	53.9	12.5	11.7
3694.373	PK	44.6	43.5	28.3	3.9	31.8	-2.9	42.1	41.0	53.9	11.8	12.9
4617.966	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
5541.559	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
6465.152	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
7388.746	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
8312.339	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-
9235.932	PK	NS	NS	-	-	-	-2.9	-	-	53.9	-	-

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).

*NS: No Signal

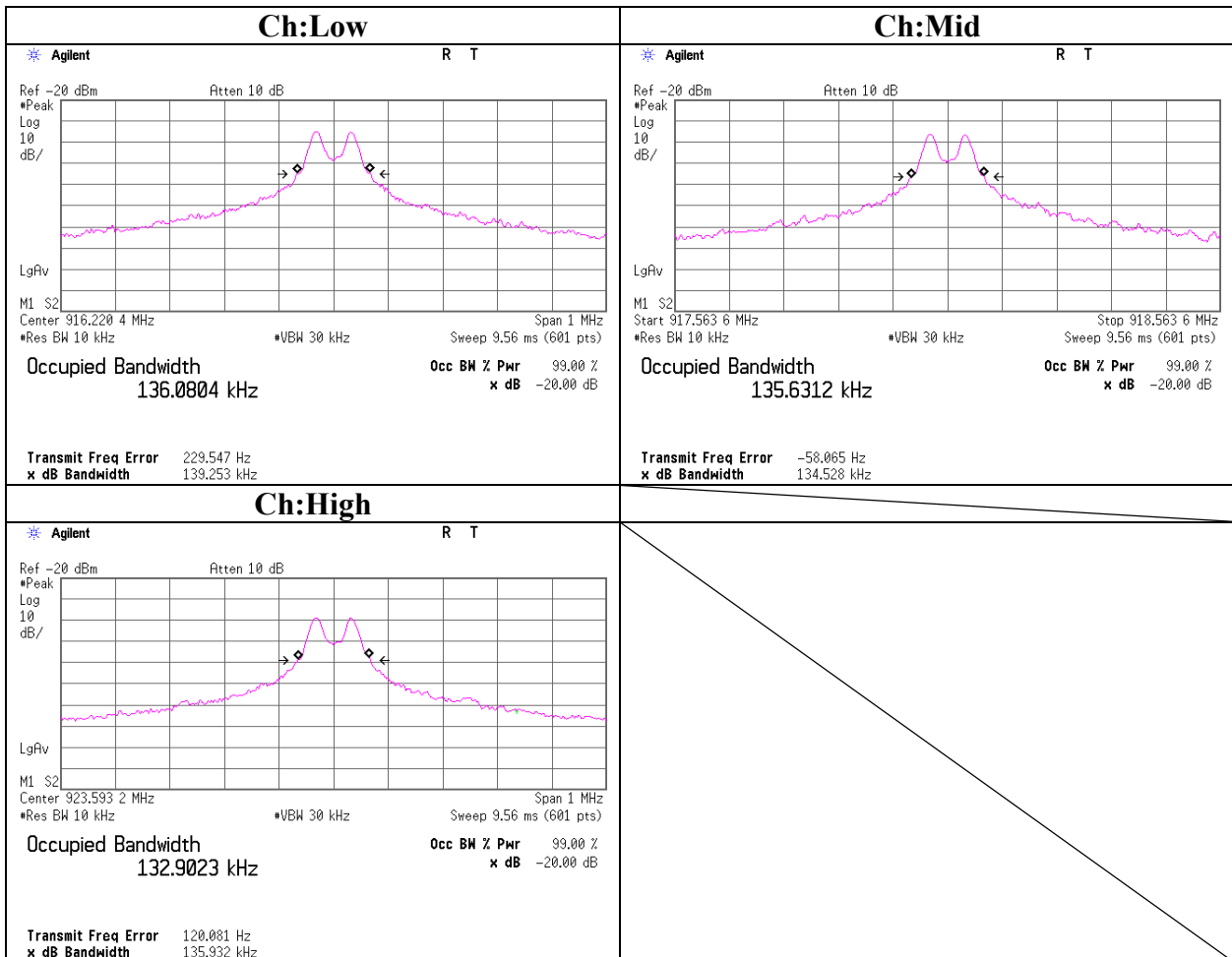
- * The test above 1GHz was performed with PK detect. Average emission measurements were calculated with PK detect and Duty cycle factor.
- * Duty Factor was calculated with the assumption of the worst condition in 100msec.
- * The noise measured with PK detect was pulse emission.

20dB Bandwidth

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	30CE0008-YK-01
Date	06/16/2010
Temperature/ Humidity	24 deg. C. / 69%
Engineer	Katsunori Okai
Mode	Transmitting mode

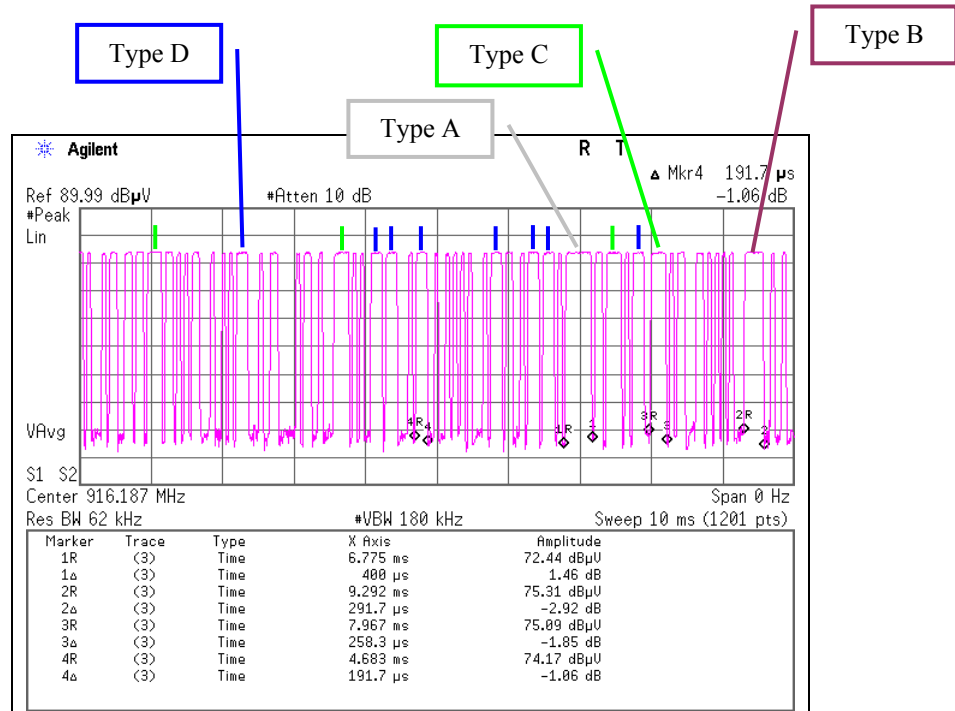
Frequency [MHz]	20dB Bandwidth [kHz]	Limit [kHz]
916.2204	139.253	-
918.0636	134.528	-
923.5932	135.932	-

20dB Bandwidth



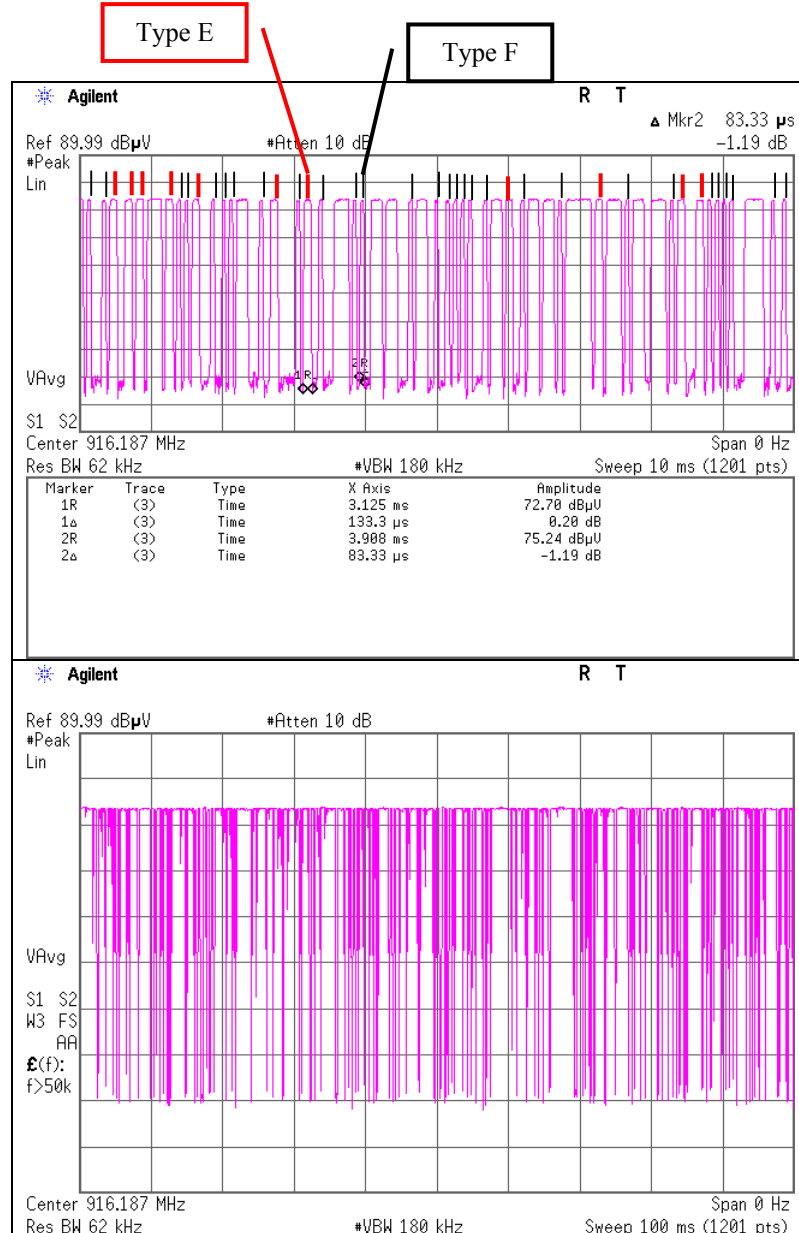
Duty Cycle

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	30CE0008-YK-01
Date	06/15/2010
Temperature/ Humidity	23 deg. C. / 67%
Engineer	Katsunori Okai
Mode	Transmitting mode



Duty Cycle

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	30CE0008-YK-01
Date	06/15/2010
Temperature/ Humidity	23 deg. C. / 67%
Engineer	Katsunori Okai
Mode	Transmitting mode



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/CE	2009/08/17 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE/CE	2010/02/09 * 12
MJM-05	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE/CE	2009/11/20 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE/CE	2010/04/19 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2009/10/05 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2010/01/23 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2010/02/22 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2009/11/12 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2009/09/02 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2010/01/19 * 12
MCC-47	Microwave Cable	Suhner	SUCOFLEX104	295123(5m) / 287573(1m)	RE	2009/11/19 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2009/09/14 * 12
MBF-13	Band Pass Filter	M-CiTY	BPF0850-01	UL0011	RE	2009/09/11 * 12
MCC-77	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278942/4	RE	2009/12/19 * 12
MHF-18	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	7002	RE	2009/12/19 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2010/02/04 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2010/01/20 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/ 5D-2W(5m)/5D- 2W(0.8m)/ 5D-2W(1m)	-	CE	2010/02/22 * 12
MAT-65	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 test

RE: Radiated emission, 20dB bandwidth , Automatically deactivate and Duty cycle tests

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