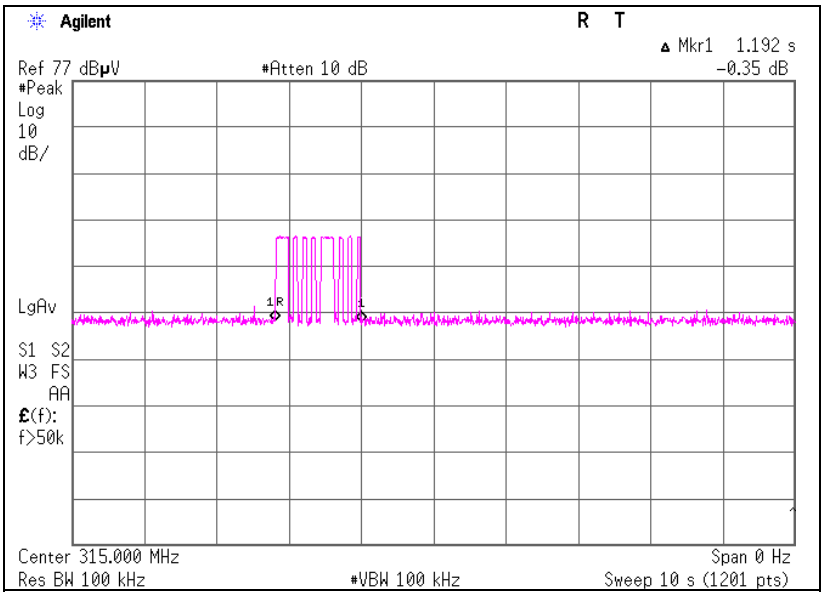
APPENDIX 2: Data of EMI test

Automatically deactivate

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	30JE0115-HO-01
Date	06/07/2010
Temperature/ Humidity	23 deg.C./ 67%
Engineer	Keisuke Kawamura
Mode	Normal use mode

Time of Transmitting [sec]	Limit [sec]	Result
1.192	5.00	Pass



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

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	30JE0115-HO-01
Date	06/07/2010
Temperature/ Humidity	23 deg.C./ 67%
Engineer	Keisuke Kawamura
Mode	Transmitting mode

QP or PK

Frequency	Detector	Reading [dBuV]		Ant Factor	Loss	Gain	Duty Factor	Result [dBuV/m]		Limit	Margin [dB]		Remark Inside or Outside
[MHz]		Hor	Ver	[dB/m]	[dB]	[dB]	[dB]	Hor	Ver	[dBuV/m]	Hor	Ver	of Restricted Bands
72.006	QP	32.3	43.9	6.5	7.6	32.0	-	14.4	26.0	55.6	41.2	29.6	Outside
315.000	PK	56.7	52.9	16.2	9.8	31.9	-	50.8	47.0	95.6	44.8	48.6	Carrier
630.000	PK	30.5	31.7	20.7	11.6	32.1	-	30.7	31.9	75.6	44.9	43.7	Outside
945.000	PK	31.5	32.5	25.2	13.1	31.2	-	38.6	39.6	75.6	37.0	36.0	Outside
1260.000	PK	43.7	45.8	24.5	2.2	33.9	-	36.5	38.6	75.6	39.1	37.0	Outside
1575.000	PK	50.9	49.4	25.4	2.5	33.2	-	45.6	44.1	73.9	28.3	29.8	Inside
1890.000	PK	48.1	46.8	25.8	2.6	32.5	-	44.0	42.7	75.6	31.6	32.9	Outside
2205.000	PK	49.0	47.1	26.4	2.8	32.2	-	46.0	44.1	73.9	27.9	29.8	Inside
2520.000	PK	48.0	47.2	27.0	3.0	32.1	-	45.9	45.1	75.6	29.7	30.5	Outside
2835.000	PK	45.2	43.2	27.7	3.2	31.9	-	44.2	42.2	73.9	29.7	31.7	Inside
3150.000	PK	42.6	42.3	28.4	3.3	31.8	-	42.5	42.2	75.6	33.1	33.4	Outside

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

PK with Duty factor

Frequency	Detector	Reading [dBuV]		Ant Factor	Loss	Gain	Duty Factor	Result [dBuV/m]		Limit	Margin [dB]		Remark
[MHz]		Hor	Ver	[dB/m]	[dB]	[dB]	[dB]	Hor	Ver	[dBuV/m]	Hor	Ver	
315.000	PK	56.7	52.9	16.2	9.8	31.9	-5.1	45.7	41.9	75.6	29.9	33.7	Carrier
630.000	PK	30.5	31.7	20.7	11.6	32.1	-5.1	25.6	26.8	55.6	30.0	28.8	Outside
945.000	PK	31.5	32.5	25.2	13.1	31.2	-5.1	33.5	34.5	55.6	22.1	21.1	Outside
1260.000	PK	43.7	45.8	24.5	2.2	33.9	-5.1	31.4	33.5	55.6	24.2	22.1	Outside
1575.000	PK	50.9	49.4	25.4	2.5	33.2	-5.1	40.5	39.0	53.9	13.4	14.9	Inside
1890.000	PK	48.1	46.8	25.8	2.6	32.5	-5.1	38.9	37.6	55.6	16.7	18.0	Outside
2205.000	PK	49.0	47.1	26.4	2.8	32.2	-5.1	40.9	39.0	53.9	13.0	14.9	Inside
2520.000	PK	48.0	47.2	27.0	3.0	32.1	-5.1	40.8	40.0	55.6	14.8	15.6	Outside
2835.000	PK	45.2	43.2	27.7	3.2	31.9	-5.1	39.1	37.1	53.9	14.8	16.8	Inside
3150.000	PK	42.6	42.3	28.4	3.3	31.8	-5.1	37.4	37.1	55.6	18.2	18.5	Outside

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amprifier) + 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.
* The noise measured with PK detect was pulse emission.

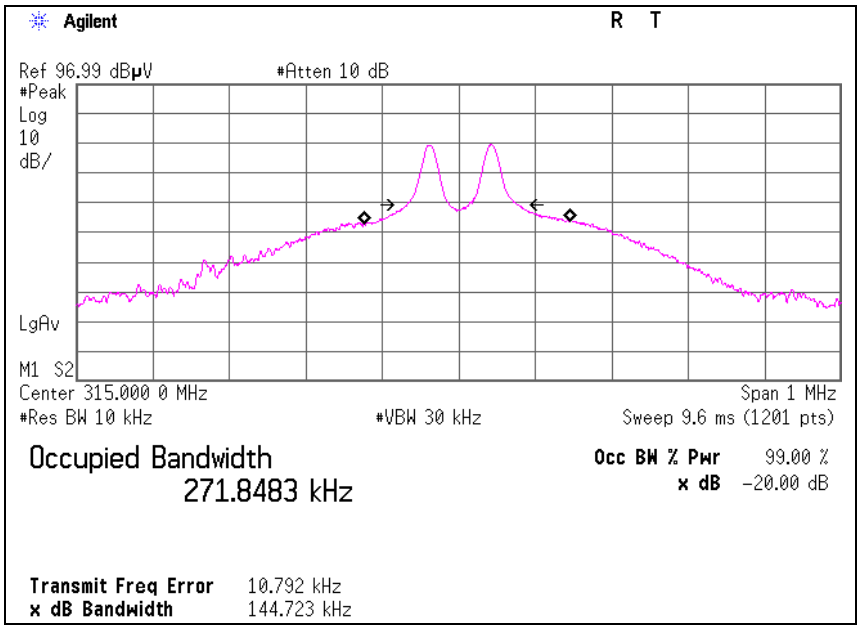
-20dB and 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	30JE0115-HO-01
Date	06/07/2010
Temperature/ Humidity	23 deg.C./ 67%
Engineer	Keisuke Kawamura
Mode	Transmitting mode

Bandwidth Limit : Fundamental Frequency **315** MHz x 0.25% = 787.50 kHz

-20dB Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
144.72	787.50	Pass

99% Occupied Bandwidth [kHz]	Bandwidth Limit [kHz]	Result
271.85	787.50	Pass



Duty Cycle

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	30JE0115-HO-01
Date	06/07/2010
Temperature/ Humidity	23 deg.C./ 67%
Engineer	Keisuke Kawamura
Mode	Transmitting mode

Type	Times	ON time(One pulse) [ms]	ON time(in 20ms) [ms]	ON time(in 100ms) [ms]
A	8	0.453	3.6264	18.132
B	31	0.243	7.5423	37.7115

*1)ON time(in 100ms) = Times * ON time(One pulse)*5
*2)The train of pulses was exceeding 100msec, and that sampled 100msec was the worst case against the pulse train.

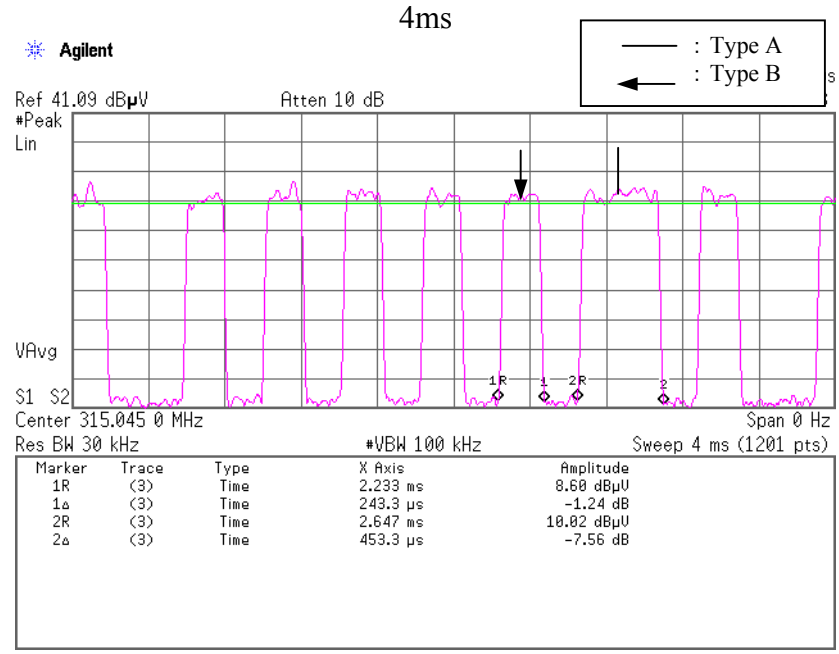
(Total)

ON time [ms]	Cycle [ms]	Duty (On time/Cycle)	Duty [dB]
55.84	100.00	0.56	-5.1

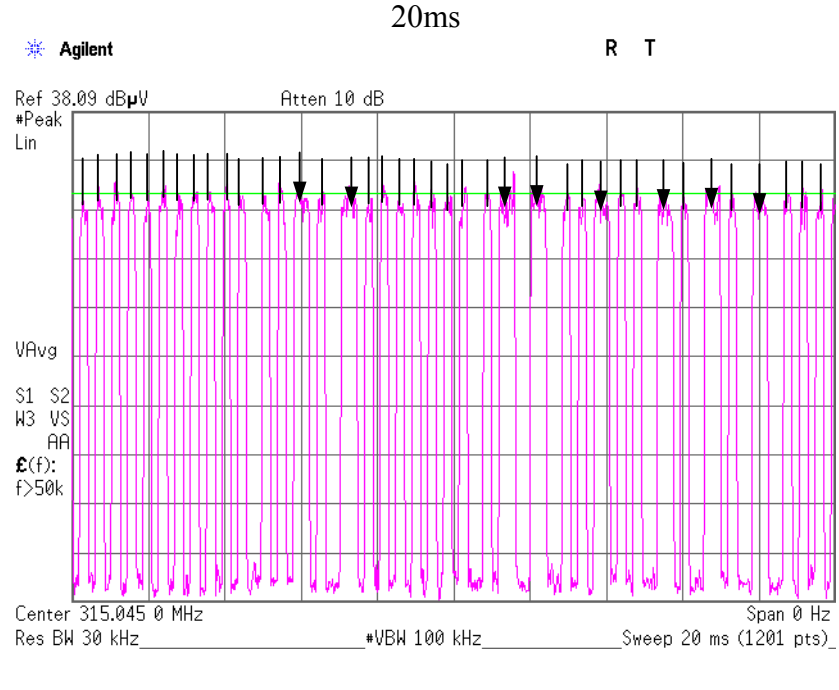
*3)ON time = Type A's ON time (in 100ms) + Type B's ON time (in 100ms)
*4)Duty = $20\log_{10}$(ON time/Cycle)

Duty Cycle

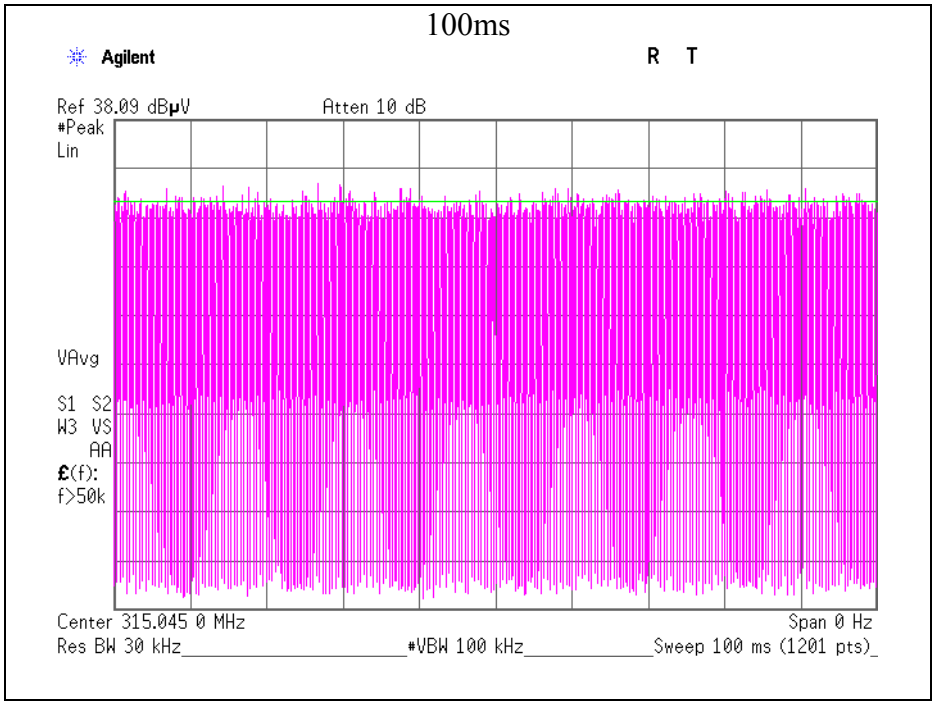
4ms



20ms



Duty Cycle


100ms
Agilent
R T
Ref 38.09 dBµV
Atten 10 dB
#Peak
Lin
VAvg
S1 S2
W3 VS
AA
£(f):
f>50k
Center 315.045 0 MHz
Span 0 Hz
Res BW 30 kHz
#VBW 100 kHz
Sweep 100 ms (1201 pts)

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-08	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE	2009/12/15 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2009/10/23 * 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
MAT-51	Attenuator(6dB)	Weinschel	2	AS3557	RE	2010/01/20 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2010/03/05 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2009/08/10 * 12
MCC-57	Microwave Cable	Suhner	SUCOFLEX104	246769(1m) / 292411(5m)	RE	2009/11/17 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2010/03/16 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2009/08/25 * 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