

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2011/03/03

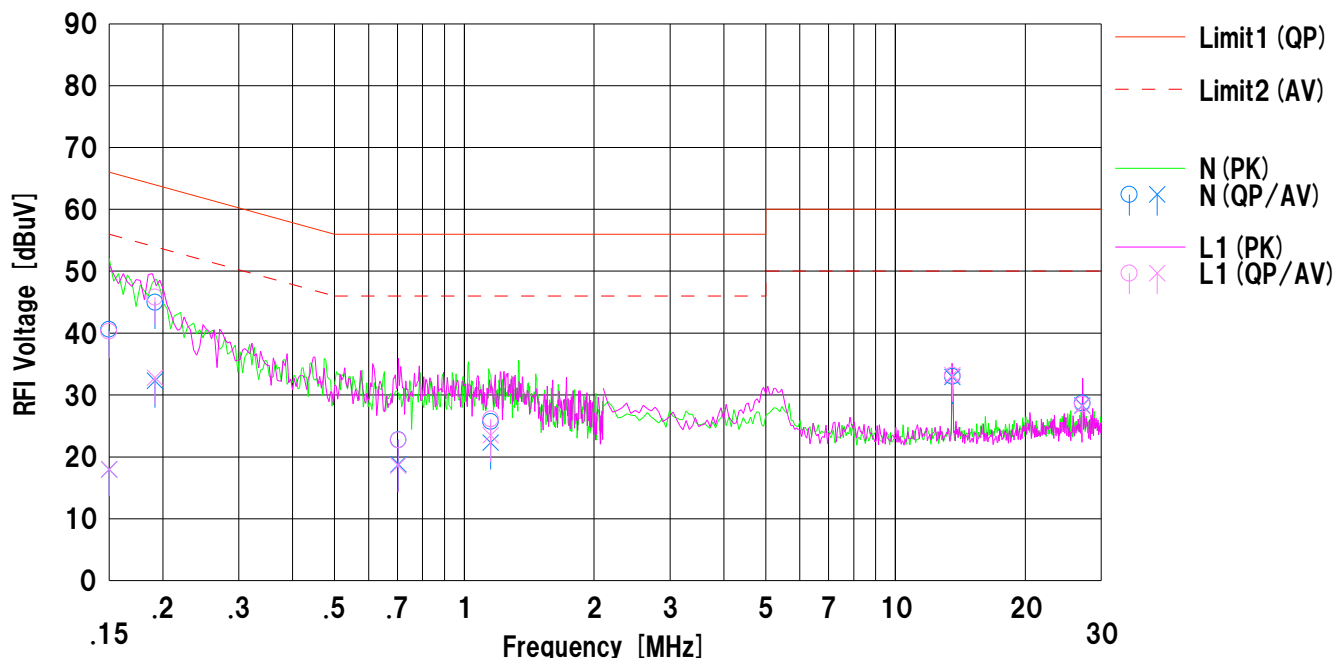
Company : Sony Corporation
Kind of EUT : Contactless IC Card Reader/Writer
Model No. : RC-S330
Serial No. : S0098010

Mode : Transmitting (13.56MHz)
Report No. : 31GE0177-SH-01-B
Power : DC5.0V (USB), AC120V/60Hz (Laptop PC)
Temp./Humi. : 23deg.C / 31% RH

Remarks : -

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Akio Hayashi



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	28.0	5.4	12.6	40.6	18.0	66.0	56.0	25.4	38.0	N	
2	0.19170	32.5	19.8	12.5	45.0	32.3	63.9	53.9	18.9	21.6	N	
3	0.70300	10.2	6.2	12.6	22.8	18.8	56.0	46.0	33.2	27.2	N	
4	1.15100	13.1	9.7	12.6	25.7	22.3	56.0	46.0	30.3	23.7	N	
5	13.56000	19.9	19.8	13.1	33.0	32.9	60.0	50.0	27.0	17.1	N	
6	27.12000	15.1	14.7	13.6	28.7	28.3	60.0	50.0	31.3	21.7	N	
7	0.15000	27.7	5.4	12.6	40.3	18.0	66.0	56.0	25.7	38.0	L1	
8	0.19170	33.3	20.3	12.5	45.8	32.8	63.9	53.9	18.1	21.1	L1	
9	0.70260	10.1	6.0	12.6	22.7	18.6	56.0	46.0	33.3	27.4	L1	
10	1.15100	13.5	10.9	12.6	26.1	23.5	56.0	46.0	29.9	22.5	L1	
11	13.56000	20.1	20.1	13.1	33.2	33.2	60.0	50.0	26.8	16.8	L1	
12	27.12000	14.9	14.6	13.6	28.5	28.2	60.0	50.0	31.5	21.8	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN Control No.: SLS-05

Data of Field Strength and Outside Filed Strength: FCC15.225(a)(b)(c)

UL Japan, Inc.
Shonan No3 Semi-Anechoic Chamber

Company:	Sony Corporation	Report No.:	31GE0177-SH-01-B	
Equipment:	Contactless IC Card Reader/Writer	Regulation:	FCC Part15 SupartC 15.225	
Model:	RC-S330	Test Distance:	3m	
Sample No.:	S0098010	Date:	2011/3/4	2011/3/10
Power:	AC 120V / 60Hz (DC 5.0V)	Temperature:	22deg.C	21deg.C
Mode:	Transmitting 13.56MHz	Humidity:	20% RH	22% RH
		ENGINEER:	Hikaru Shirasawa	Shinichi Takano
			(Field strength)	(Outside Field strength)

Remarks: : Felica 212kbps(Axis:Hor_Z/Ver_Y) , Vertical polarization (antenna angle) of the worst case: 0deg

Field strength

No.	FREQ [MHz]	T/R Reading		ANT Factor	LOSS [dB]	AMP GAIN [dB]	RESULT		LIMIT (3m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]				Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.560	46.8	51.6	19.6	6.3	32.2	40.5	45.3	123.9	83.4	78.6

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]

Field strength of 13.553MHz to 13.567MHz Limit(3m) = 83.9dBuV/m + 40log 30m/3m
= 123.9dBuV/m (FCC15.225(a))

Outside Field strength

No.	FREQ [MHz]	T/R Reading		ANT Factor	LOSS [dB]	AMP GAIN [dB]	RESULT		LIMIT (3m) [dBuV/m]	MARGIN	
		Hor [dBuV]	Ver [dBuV]				Hor [dBuV/m]	Ver [dBuV/m]		Hor [dB]	Ver [dB]
1	13.110	30.5	30.5	19.6	6.3	32.2	24.2	24.2	69.5	45.3	45.3
2	13.410	30.5	31.1	19.6	6.3	32.2	24.2	24.8	80.5	56.3	55.7
3	13.553	51.7	60.6	19.6	6.3	32.2	45.4	54.3	90.4	45.0	36.1
4	13.567	50.6	59.4	19.6	6.3	32.2	44.3	53.1	90.5	46.2	37.4
5	13.710	30.7	30.7	19.6	6.3	32.2	24.4	24.4	80.5	56.1	56.1
6	14.010	30.6	30.5	19.6	6.3	32.2	24.3	24.2	69.5	45.2	45.3

Calculation:Result[dBuV/m]=Reading[dBuV]+Ant.Fac[dB/m]+Loss(Cable+ATT)[dB]-Gain(AMP)[dB]

Outside filed strength frequencies

- filed strength band $F_c \pm 7\text{kHz}$:13.553MHz to 13.567MHz
 - Outside filde strength $F_c \pm 150\text{kHz}$:13.410MHz to 13.710MHz
 - Outside filde strength $F_c \pm 450\text{kHz}$:13.110MHz to 14.010MHz
- $F_c = 13.56\text{MHz}$

Limits (3m)

- 13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz : $50.5\text{dBuV/m} + 40\log 30\text{m}/3\text{m} = 90.5\text{dBuV/m}$ (FCC15.225(b))
- 13.110MHz to 14.010MHz and 13.710MHz to 14.010MHz : $40.5\text{dBuV/m} + 40\log 30\text{m}/3\text{m} = 80.5\text{dBuV/m}$ (15.225(c))
- Below 13.110MHz and Above 14.010MHz : $29.5\text{dBuV/m} + 40\log 30\text{m}/3\text{m} = 69.5\text{dBuV/m}$ (FCC15.225(d)and FCC15.209)

Radiated Emission

UL Japan, Inc.
Shonan No5 Shield room

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S330
Sample No.: S0098010
Power: AC 120V / 60Hz (DC 5.0V)
Mode: Transmitting 13.56MHz
EUT axis: See Remarks

Report No.: 31GE0177-SH-01-B
Regulation: FCC Part15 SupartC 15.225
Date: 2011/3/10 2011/3/3
Temperature: 21deg.C 22deg.C
Humidity: 22%RH 30% RH
ENGINEER: Shinichi Takano Hikaru Shirasawa
(below 30MHz) (above30MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	27.12	QP	32.1	20.5	6.5	32.2	26.9	69.5	42.6	100	326	Y-axis
Hori.	40.68	QP	36.0	14.4	6.7	32.1	25.0	40.0	15.0	296	340	Y-axis
Hori.	54.24	QP	31.9	9.7	6.8	32.1	16.3	40.0	23.7	400	194	Y-axis
Hori.	67.80	QP	43.3	6.8	6.9	32.1	24.9	40.0	15.1	264	196	Y-axis
Hori.	81.36	QP	27.7	6.4	7.0	32.1	9.0	40.0	31.0	217	108	Y-axis
Hori.	94.92	QP	36.4	8.9	7.2	32.1	20.4	43.5	23.1	300	232	Y-axis
Hori.	108.48	QP	24.4	11.0	7.3	32.1	10.6	43.5	32.9	300	335	Y-axis
Hori.	122.04	QP	39.6	12.4	7.4	32.1	27.3	43.5	16.2	150	139	Y-axis
Hori.	135.60	QP	26.3	13.3	7.5	32.1	15.0	43.5	28.5	141	162	Y-axis
Hori.	230.52	QP	46.6	16.8	8.0	32.0	39.4	46.0	6.6	142	359	Y-axis
Hori.	257.64	QP	47.4	17.4	8.2	32.0	41.0	46.0	5.0	104	191	Y-axis
Hori.	311.22	QP	45.2	14.2	8.5	31.9	36.0	46.0	10.0	100	215	Y-axis
Vert.	27.12	QP	38.9	20.5	6.5	32.2	33.7	69.5	35.8	100	64	Y-axis(Antenna:90deg.)
Vert.	40.68	QP	47.3	14.4	6.7	32.1	36.3	40.0	3.7	100	261	Y-axis
Vert.	40.68	QP	47.7	14.4	6.7	32.1	36.7	40.0	3.3	100	266	Z-axis
Vert.	54.24	QP	35.9	9.7	6.8	32.1	20.3	40.0	19.7	100	276	Y-axis
Vert.	67.80	QP	44.5	6.8	6.9	32.1	26.1	40.0	13.9	100	301	Y-axis
Vert.	81.36	QP	38.8	6.4	7.0	32.1	20.1	40.0	19.9	118	255	Y-axis
Vert.	94.92	QP	49.5	8.9	7.2	32.1	33.5	43.5	10.0	100	284	Y-axis
Vert.	108.48	QP	34.1	10.9	7.3	32.1	20.2	43.5	23.3	100	264	Y-axis
Vert.	122.04	QP	52.3	12.4	7.4	32.1	40.0	43.5	3.5	100	77	Y-axis
Vert.	122.04	QP	51.7	12.4	7.4	32.1	39.4	43.5	4.1	100	132	Z-axis
Vert.	135.60	QP	31.3	13.3	7.5	32.1	20.0	43.5	23.5	100	87	Y-axis
Vert.	149.16	QP	50.5	14.3	7.6	32.1	40.3	43.5	3.2	100	65	Y-axis
Vert.	149.16	QP	50.2	14.3	7.6	32.1	40.0	43.5	3.5	100	94	Z-axis
Vert.	176.28	QP	43.9	15.7	7.7	32.0	35.3	43.5	8.2	100	42	Y-axis
Vert.	648.63	QP	31.3	19.0	9.8	31.8	28.3	46.0	17.7	100	145	Y-axis

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

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

Data of Frequency Tolerance: FCC 15.225(e) (1/3)

UL Japan, Inc.
Shonan No5 Shield room

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S330
Sample No.: S0098010
Power: AC 120V / 60Hz (DC 5.0V)
Mode: Transmitting 13.56MHz

Report No.: 31GE0177-SH-01-B
Regulation: FCC Part15 SupartC 15.225
Date: 2011/3/4
Temperature: 23deg.C
Humidity: 32% RH
ENGINEER: Akio Hayashi

Temperature Variation: -30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559893	-0.000107	-0.00079	0.01
after 2minutes	13.56	13.559926	-0.000074	-0.00055	0.01
after 5minutes	13.56	13.559935	-0.000065	-0.00048	0.01
after 10minutes	13.56	13.559938	-0.000062	-0.00046	0.01

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559903	-0.000097	-0.00072	0.01
after 2minutes	13.56	13.559962	-0.000038	-0.00028	0.01
after 5minutes	13.56	13.559968	-0.000032	-0.00024	0.01
after 10minutes	13.56	13.559970	-0.000030	-0.00022	0.01

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559944	-0.000056	-0.00041	0.01
after 2minutes	13.56	13.559970	-0.000030	-0.00022	0.01
after 5minutes	13.56	13.559980	-0.000020	-0.00015	0.01
after 10minutes	13.56	13.559980	-0.000020	-0.00015	0.01

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559970	-0.000030	-0.00022	0.01
after 2minutes	13.56	13.559978	-0.000022	-0.00016	0.01
after 5minutes	13.56	13.559977	-0.000023	-0.00017	0.01
after 10minutes	13.56	13.559976	-0.000024	-0.00018	0.01

Data of Frequency Tolerance: FCC 15.225(e) (2/3)

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S330
Sample No.: S0098010
Power: AC 120V / 60Hz (DC 5.0V)
Mode: Transmitting 13.56MHz

Report No.: 31GE0177-SH-01-B
Regulation: FCC Part15 SupartC 15.225
Date: 2011/3/4
Temperature: 23deg.C
Humidity: 32% RH
ENGINEER: Akio Hayashi

UL Japan, Inc.
Shonan No5 Shield room

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559979	-0.000021	-0.00015	0.01
after 2minutes	13.56	13.559969	-0.000031	-0.00023	0.01
after 5minutes	13.56	13.559966	-0.000034	-0.00025	0.01
after 10minutes	13.56	13.559965	-0.000035	-0.00026	0.01

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559974	-0.000026	-0.00019	0.01
after 2minutes	13.56	13.559959	-0.000041	-0.00030	0.01
after 5minutes	13.56	13.559956	-0.000044	-0.00032	0.01
after 10minutes	13.56	13.559956	-0.000044	-0.00032	0.01

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559963	-0.000037	-0.00027	0.01
after 2minutes	13.56	13.559955	-0.000045	-0.00033	0.01
after 5minutes	13.56	13.559955	-0.000045	-0.00033	0.01
after 10minutes	13.56	13.559956	-0.000044	-0.00032	0.01

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559955	-0.000045	-0.00033	0.01
after 2minutes	13.56	13.559962	-0.000038	-0.00028	0.01
after 5minutes	13.56	13.559968	-0.000032	-0.00024	0.01
after 10minutes	13.56	13.559971	-0.000029	-0.00021	0.01

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559958	-0.000042	-0.00031	0.01
after 2minutes	13.56	13.559992	-0.000008	-0.00006	0.01
after 5minutes	13.56	13.560004	0.000004	0.00003	0.01
after 10minutes	13.56	13.560010	0.000010	0.00007	0.01

Data of Frequency Tolerance: FCC 15.225(e) (3/3)

UL Japan, Inc.
Shonan No5 Shield room

Company: Sony Corporation
Equipment: Contactless IC Card Reader/Writer
Model: RC-S330
Sample No.: S0098010
Power: AC 120V / 60Hz (DC 5.0V)
Mode: Transmitting 13.56MHz

Report No.: 31GE0177-SH-01-B
Regulation: FCC Part15 SupartC 15.225
Date: 2011/3/4
Temperature: 23deg.C
Humidity: 32% RH
ENGINEER: Akio Hayashi

Input Voltage:DC4.25V (85%)

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559975	-0.0000250	-0.00018	0.01
after 2minutes	13.56	13.559961	-0.0000390	-0.00029	0.01
after 5minutes	13.56	13.559959	-0.0000410	-0.00030	0.01
after 10minutes	13.56	13.559958	-0.0000420	-0.00031	0.01

Input Voltage:DC5.75V (115%)

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (MHz)	Frequency Tolerance (%)	Limit (%)
startup	13.56	13.559968	-0.0000320	-0.00024	0.01
after 2minutes	13.56	13.559959	-0.0000410	-0.00030	0.01
after 5minutes	13.56	13.559958	-0.0000420	-0.00031	0.01
after 10minutes	13.56	13.559958	-0.0000420	-0.00031	0.01

20dB bandwidth & Occupied bandwidth (99%): FCC 15.215

UL Japan, Inc.
Shonan No5 Shield room

Company: Sony Corporation

Equipment: Contactless IC Card Reader/Writer

Model: RC-S330

Sample No.: S0098010

Power: AC 120V / 60Hz (DC 5.0V)

Mode: Transmitting 13.56MHz

Report No.: 31GE0177-SH-01-B

Regulation: FCC Part15 SupartC 15.215

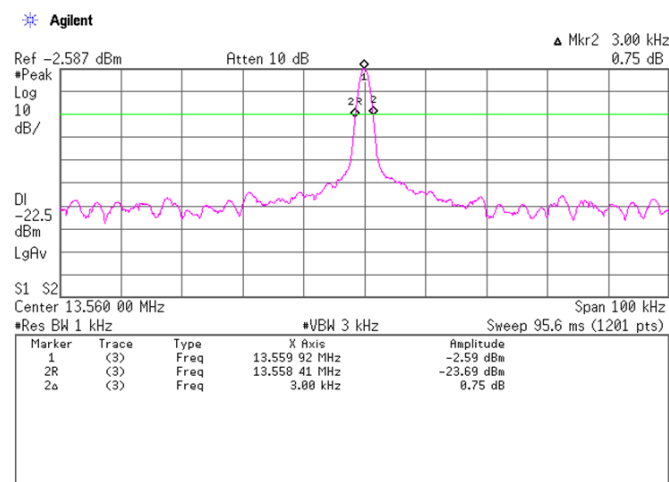
Date: 2011/3/4

Temperature: 23deg.C

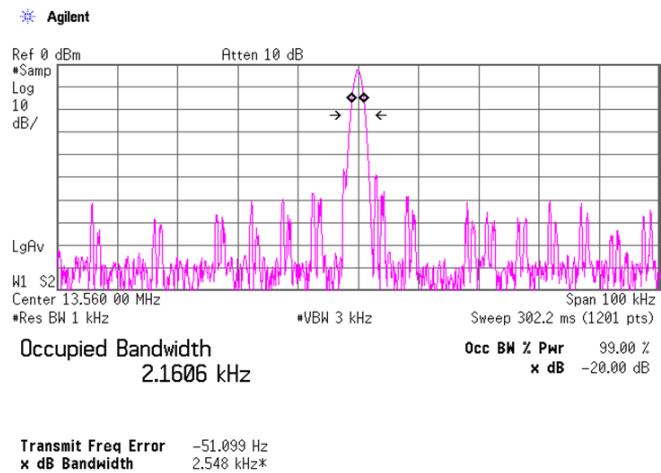
Humidity: 32% RH

ENGINEER: Akio Hayashi

20dB Bandwidth: 3.00kHz



OBW(99%): 2.16kHz



APPENDIX 3 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2011/02/17 * 12
SAT6-03	Attenuator	JFW	50HF-006N	-	RE	2011/02/17 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2010/10/15 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2010/04/02 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2010/10/15 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2011/02/23 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	RE/CE	2010/08/18 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE/CE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2010/09/13 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV	-	RE/CE	-
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2010/04/02 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2011/02/23 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2011/02/17 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2011/03/02 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	FT	2011/03/02 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	FT	2010/04/05 * 12
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	FT	2010/04/24 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	BW	2011/02/02 * 12
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2010/10/15 * 12
STR-03	Test Receiver	Rohde & Schwarz	ESI40	100054/040	RE	2010/07/21 * 12

The expiration date of the calibration is the end of the expired month .

As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with traceable calibrations . Each calibration is traceable to the national or international standards .

Test Item :

CE: Conducted emission ,

RE: Radiated emission ,

FT: Frequency Tolerance ,

BW:-20dB Bandwidth or 99% Occupied Bandwidth