TEST REPORT

For

NFC Reader / Writer module

In conformity with

FCC CFR 47 Part15C / October 1, 2008

Model: TN32MSEC003S

FCC ID: WBGTN32MSEC003S

Test Item: NFC Reader / Writer module

Report No: RY0910H27R1

Issue Date: October 27, 2008

Prepared for

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Prepared by

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Table of contents

History

Report No	Date	Revisions	Isseud by
RY0910H13R1	October 13, 2009	Initial Issue	**T. Hori**
RY00910H27R1	October 27, 2009	Retest Frequency stability	**T. Hori**

1 General information

1.1 Product description

Test item	: NFC Reader / Writer module
Manufacturer	: Zixsys Inc.
Address	: 4th Floor, Akari building, 1-312 Kagoharaminami, Kumagayasi, Saitama 360-0847, JAPAN
Model	: TN32MSEC003S
FCC ID	: WBGTN32MSEC003S
Type of modulation	: ASK 10%/100%
Serial numbers	: M0001
Transmitting Frequency	: 13.56 MHz (RFID)
Clock Frequency	: 8.0 MHz, 27.12 MHz
Receipt date of EUT	: October 5, 2009
Nominal power source voltages	: DC 5.0V

1.2 Test(s) performed/ Summary of test result

Test specification(s)	: FCC CFR 47. Part 15C / October 1, 2008
Test method(s)	: ANSI C63.4: 2003
Test(s) started	: October 5, 2009
Test(s) completed	: October 27, 2009
Purpose of test(s)	: Grant for Certification of FCC
Test condition	: Continuous transmission mode (Mifare 106 kbps, Felica 212 kbps)
Test Temperature	: -10 degree to +60 degree (Manufacture' declared)
Summary of test result	: Complied

Note: The above judgment is only based on the measurement data and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.
The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.
Compliance of the EUT is more probable than non-compliance is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer : T. Hori (EMC Testing Department)

Reviewer : K. Ohnishi (Manager, EMC Testing Department)

1.3 Test facility

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at **RF Technologies Ltd.**, located in 472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948, per October 1, 2008. The description of the test facilities has been filed under registration number 319924 at the Office of the Federal Communications Commission. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.
The list of all public test facilities is available on the Internet at http://www.fcc.gov.

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)
Each registered facility number is as follows;
Test site (Semi Anechoic chamber 3m) R-2393
Test site (Shielded room) C-2617

Registered by Industry Canada (IC) Each registered facility number is as follows;
Test site No.1 (Semi Anechoic chamber 3m): 6974A

Accredited by **National Voluntary Laboratory Accreditation Program** (NVLAP) for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NVLAP LAB CODE 200780-0

1.4 Measurement uncertainty

The treatment of uncertainty is based on the general matters on the definition of uncertainty in “Guide to the expression of uncertainty in measurement (GUM)” published by ISO. The Lab’s uncertainty is determined by referring UKAS Publication LAB34: 2002 “The Expression of Uncertainty in EMC Testing” and CISPR16-4-2: 2003 “Uncertainty in EMC Measurements”.
The uncertainty of the measurement result in the level of confidence of approximately 95% (k=2) is as follows;

RF frequency: ± 1 x 10^{-7}
Conducted emission of receivers: ± 1.9 dB
Radiated emission (9 kHz - 30MHz): ± 2.8 dB
Radiated emission (30MHz - 1000MHz): ± 5.7 dB
Temperature: ± 1 degree

1.5 Summary of test results

Requirement of;	Section in FCC15	Result	Section in this report
1.5.1 Occupied bandwidth (20 dB and 99%)	-	-	2.1
1.5.2 Transmitter AC power line conducted emissions	15.207	Complied	2.2
1.5.3 Transmitter radiated emissions between 9kHz to 30 MHz	15.225(a),(b),(c) and (d)	Complied	2.3
1.5.4 Transmitter radiated emissions between 30MHz to 1000 MHz	15.225 (d)	Complied	2.4
1.5.5 Carrier frequency stability	15.225 (e)	Complied	2.5

The field strength of spurious emission was measured in three orthogonal EUT positions (X-Plane, Y- Plane and Z- Plane). The axis defined in the photographs in clause 3.1 in this report.

1.6 Setup of equipment under test (EUT)

1.6.1 Test configuration of EUT

Equipment(s) under test:

	Item	Manufacturer	Model No.	Serial No.	FCC ID/ IC Certification No.
A	NFC Reader/Writer module	Zixsys Inc.	TN32MSEC003S	M0001	WBGTN32MSEC003S

Support Equipment(s):

	Item	Manufacturer	Model No.	Serial No.	FCC ID
B	Personal computer	HITACHI	PC-XNB2-112ABGW	12292	-
C	AC Adaptor	HITACHI	PC-AP7300	4800109202	-
D	USB Box jig	Zixsys Inc.	-	-	-

Connected cable(s):

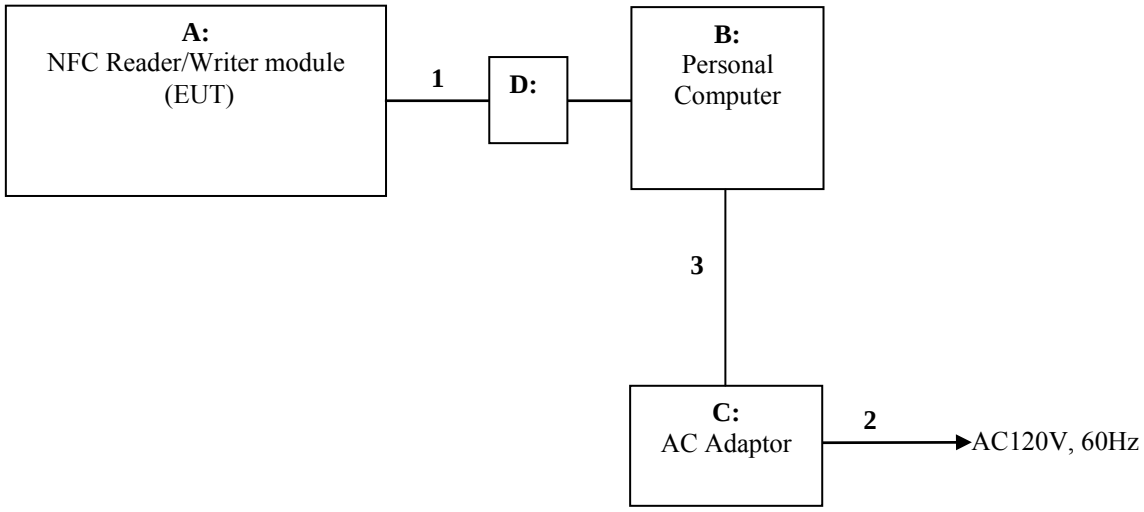
No.	Item	Identification (Manu.e.t.c)	Shielded YES / NO	Ferrite Core YES / NO	Connector Type Shielded YES / NO	Length (m)
1	USB Cable	-	No	No	No	1.5
2	AC Cable	HITACHI	No	Yes	No	1.8
3	DC Cable	HITACHI	No	Yes	No	1.8

1.6.2 Operating condition:

Operating mode:

Continuous transmission mode (Mifare 106 kbps, Felica 212 kbps)
All tests were conducted with the test mode provided by the manufacturer.

1.6.3 Setup diagram of tested system:



1.7 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the applicable standards described in clause 1.2.

1.8 Deviation from the standard

No deviations from the standards described in clause 1.2.

2 Test procedure and test data

2.1 Occupied bandwidth (20dB/ 99%)

Test setup
Test setup was implemented according to the method of ANSI C63.4: 2003 13.1.7 “Occupied bandwidth measurements” and Annex H.6 “Occupied bandwidth measurements”.

Test procedure
Measurement procedures were implemented according to the method of ANSI C63.4: 2003 13.1.7 “Occupied bandwidth measurements” and Annex H.6 “Occupied bandwidth measurements”.
The spectrum analyzer RBW was set as follows and VBW the video bandwidth shall be set to a value at least three times greater than the RBW.
The marker-to-peak function and the marker-delta function of the spectrum analyzer were used to measure to measure the emission 20dB below the peak level.

Fundamental frequency being measured	Minimum instrument bandwidth
9 kHz to 30 MHz	1 kHz
30 MHz to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

Limitation
There are no limitations. The measurement value is used to calculation of the limitation of the channel separation and the emission designator.

Test equipment used (refer to List of utilized test equipment)

SA04	LP51	CL26

Test results – Reporting purpose.

Mifare 106 kbps

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
13.55988	2.74	2.44

Felica 212 kbps

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
13.55992	2.68	2.28

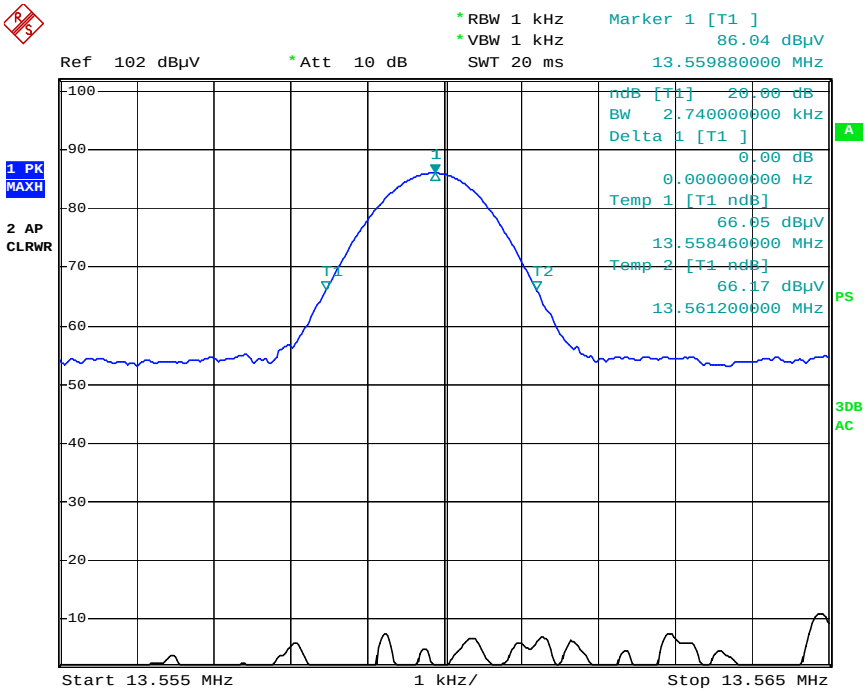
Test Data

Tested Date: October 9, 2009

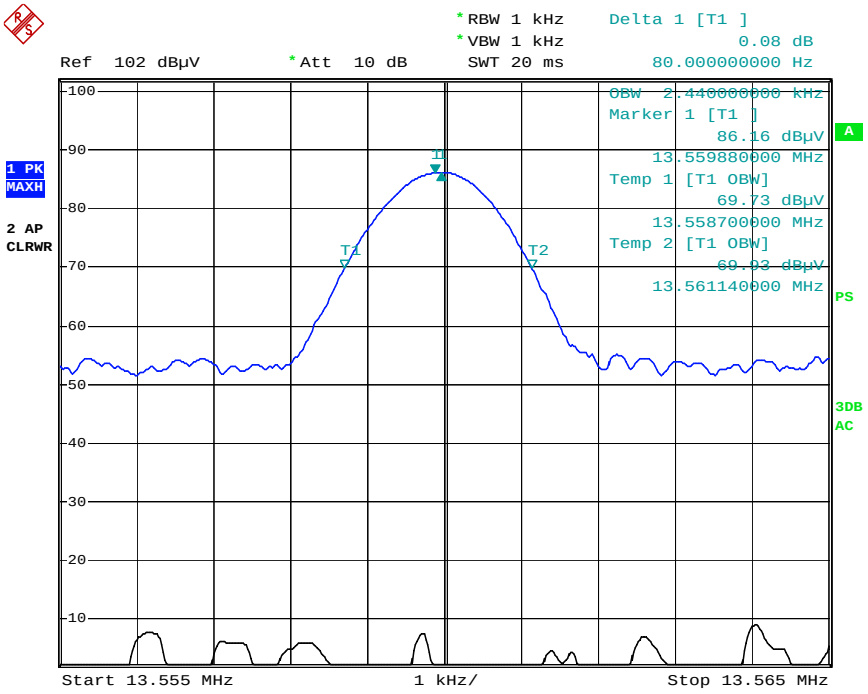
Temperature: 23 ˚C
Humidity: 55 %
Atmos. Press: 1001 hPa

Operating mode: Continuous transmission (Mifare 106 kbps)

(1) 20 dB Bandwidth

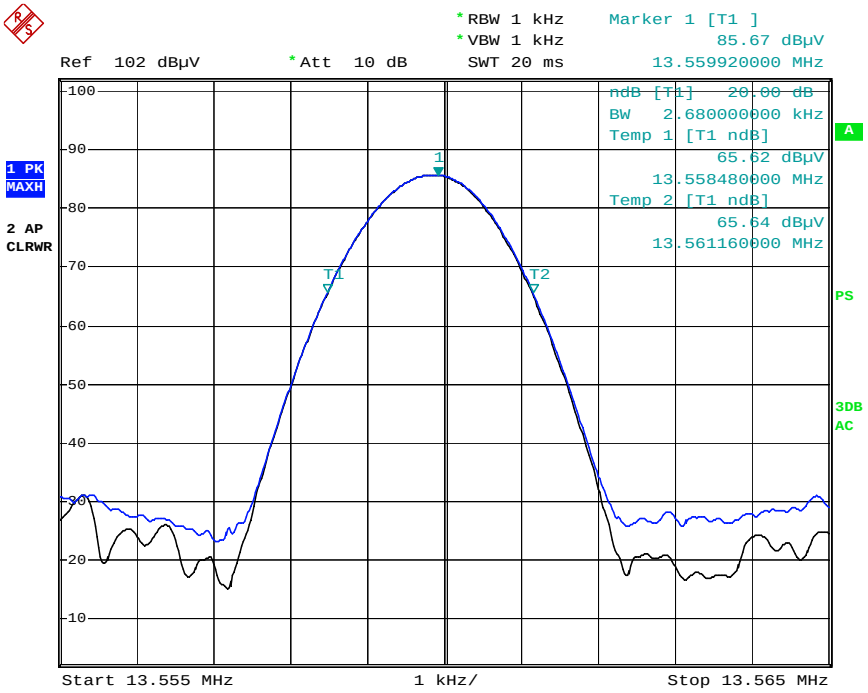


(2) 99 % Bandwidth

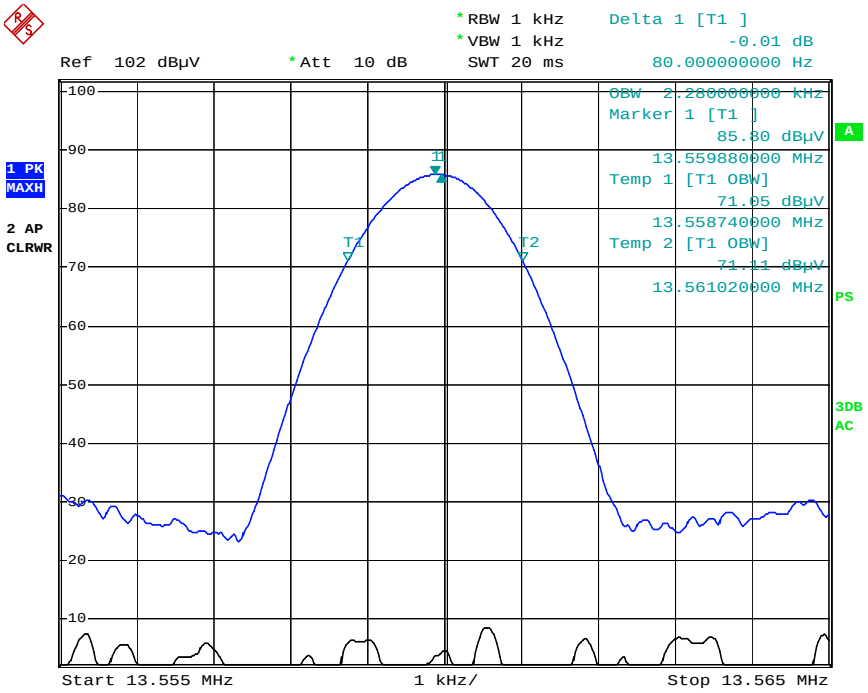


Operating mode: Continuous transmission (Felica 212 kbps)

(1) 20 dB Bandwidth



(2) 99 % Bandwidth



2.2 Transmitter AC power line conducted emissions

Test setup
Test setup was implemented according to the method of ANSI C63.4: 2003 clause 6 “General requirements for EUT equipment arrangements and operation” and Annex H.1 “AC power line conducted emission measurements setup”.

Test procedure
Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 7, clause 13.1.3 and Annex H.2 “AC power line conducted emission measurements”.
Exploratory measurements were used the spectrum analyzer to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement.
Final ac power line conducted emission measurements were performed based on the exploratory tests.
The EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit are selected for the final measurement.
When the measurement value is grater than average limitation the average detection measurements were performed.

Applicable rule and limitation

§15.207 (a) AC power line conducted limits

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.
The lower limit applies at the band edges.

Test equipment used (refer to List of utilized test equipment)

TR04	PL06	LN06	CL18

Test results - Complied with requirement.

Test Data

Tested Date: October 9, 2009

Temperature: 23 ˚C
Humidity: 55 %
Atmos. Press: 1001 hPa

Operating Mode: Continuous Transmission Mifare 106 kbps (Worst case configuration)

No.	Frequency [MHz]	Reading		C.F. [dB/m]	Result		Limit		Margin		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
1	0.18261	53.8	42.5	0.2	54.0	42.7	64.4	54.4	10.4	11.7	Va
2	0.18399	55.2	43.8	0.2	55.4	44.0	64.3	54.3	8.9	10.3	Vb
3	0.24343	44.5	33.8	0.1	44.6	33.9	62.0	52.0	17.4	18.1	Vb
4	0.25059	43.0	36.0	0.1	43.1	36.1	61.7	51.7	18.6	15.6	Va
5	13.56000	44.8	44.0	0.3	45.1	44.3	60.0	50.0	14.9	5.7	Vb
6	**13.56005**	**45.0**	**44.9**	**0.3**	**45.3**	**45.2**	**60.0**	**50.0**	**14.7**	**4.8**	**Va**
7	27.12000	21.9	19.4	0.5	22.4	19.9	60.0	50.0	37.6	30.1	Vb
8	27.12000	22.8	18.6	0.5	23.3	19.1	60.0	50.0	36.7	30.9	Va

The power line conducted emission voltage is calculated by adding the LISN factor and Cable loss attenuation from the measured reading. The calculation is as follows:

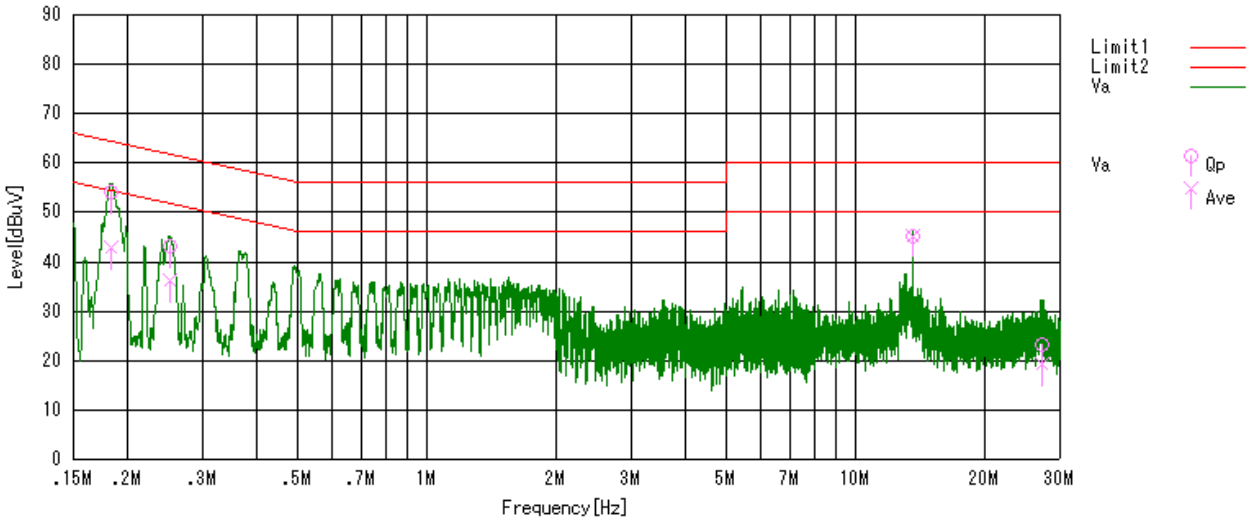
Result = Reading + C. F
where C.F = LISN Factor + Cable Loss [dB/m]

Sample calculation at 13.56005 MHz Ave. result as follow:

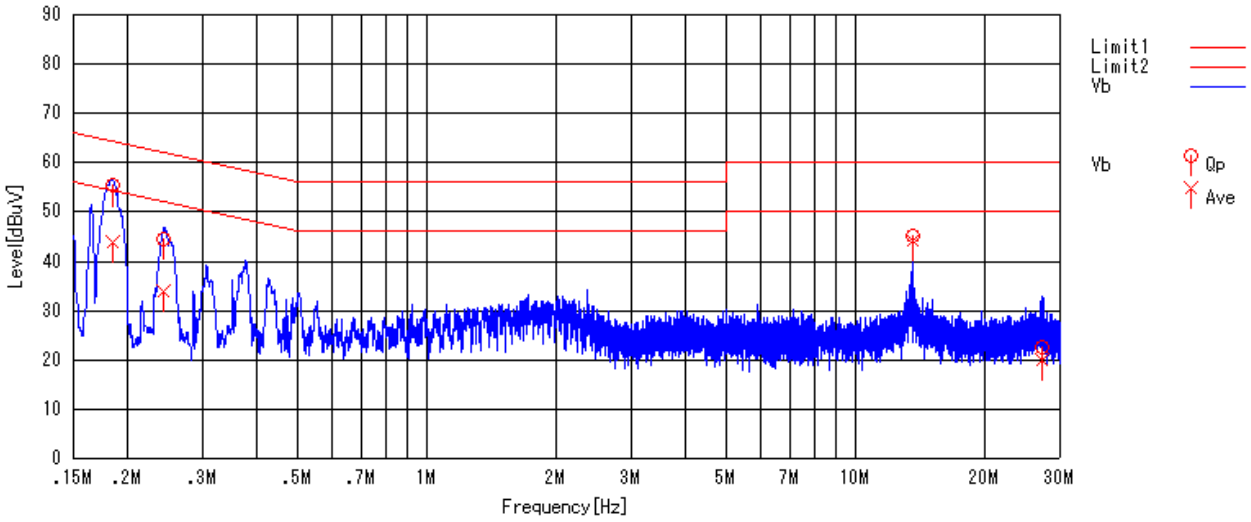
Result (dBuV) = Reading + C.F = 44.9 + 0.3 = 45.2 (dBuV)
Margin = Limit – Result = 50.0 – 45.2 = 4.8 (dB)

Graphical express of test result (0.15 MHz-30MHz)

AC Power line conducted emission. (Phase Va)



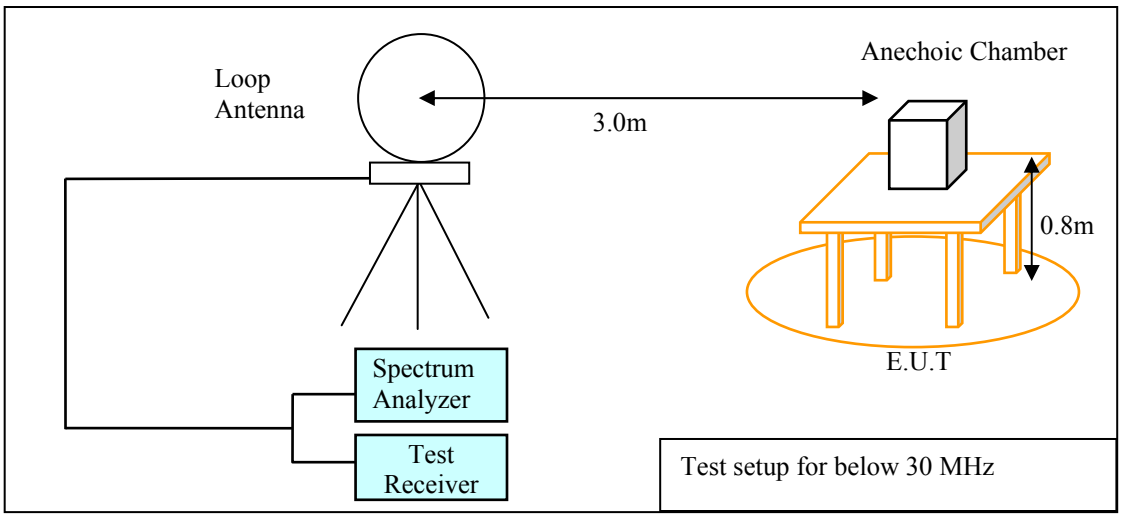
AC Power line conducted emission. (Phase Vb)



2.3 Transmitter radiated spurious emissions between 9 kHz to 30 MHz

Test setup

Test setup was implemented according to the method of ANSI C63.4: 2003 clause 6 "General requirements for EUT equipment arrangements and operation", clause 8.2 and Annex H.3 "Radiated emission measurements setup".



Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 8.2.
The EUT is place on a non-conducted table which is 0.8m height from a ground plane and the measurement antenna to EUT distance is 3 meters. The turn table is rotated for 360 degrees to determine the maximum emission level.
In the frequency range of 9 kHz to 30 MHz, a calibrated loop antenna was positioned with its plane vertical at the distance 3m from the EUT with an extrapolation of corrected distance factor and rotated about its vertical axis for maximum response at each azimuth about the EUT. For certain applications, the loop antenna also needs to be positioned horizontally. The center of the loop shall be 1 m above the ground.
EUT is placed at three different orientations (X, Y and Z axis) in order to find the worst orientation.
The spectrum analyzer and receiver is set to the followings;
Below 30 MHz: RBW=10 kHz, VBW= 30 kHz, final measurement is carried out receiver RBW=9 kHz QP

Applicable rule and limitation

§15.205 restricted bands of operation
Except as shown in paragraph 15.205 (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.490 - 0.510	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(1)

15.205(b) except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 general requirements
Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30

In the emission table above, the tighter limit applies at the band edges.
The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz.
Radiated emission limits in the above bands are based on measurements employing an average detector.

§15.225 Operation within the band 13.110 – 14.010 MHz

Frequency (MHz)	Field strength @30m (uV/m)	Field strength @30m (dBuV/m)	Field strength @3m (dBuV/m)
13.110 - 13.410	106	40.5	80.5
13.410 - 13.553	334	50.5	90.5
13.553 - 13.567	15,848	84.0	124.0
13.567 - 13.710	334	50.5	90.5
13.710 - 14.010	106	40.5	80.5

dBuV/m = 20 x log (uV/m), Corrected distance factor = 40dB / decade (15.31(f))
The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the above radiated emission limits in § 15.209.

Test equipment used (refer to List of utilized test equipment)

AC01	LP01	CL11	TR04

Test results - Complied with requirement.

Test Data

Tested Date: October 7, 2009

Temperature: 23 ˚C
Humidity: 45 %
Atmos. Press: 1012 hPa

Operating Mode: Continuous Transmission Felica 212 kbps (Worst case configuration)

Maximum configuration: EUT – Z-Plane

§15.225(a)/ (b)/ (c) Fundamental emission

Freq. (MHz)	Reading at 3m (dBuV)	Detector (QP/Ave)	Corr. Factor (dB/m)	Result (dBuV/m)	Limit at 3m (dBuV/m)	Margin (dB)
13.55988	59.5	QP	11.4	70.9	124.0	53.1

Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)

§15.225(d) Harmonics and spurious emission between 9 kHz to 30 MHz (refer 15.209 and 15.205)

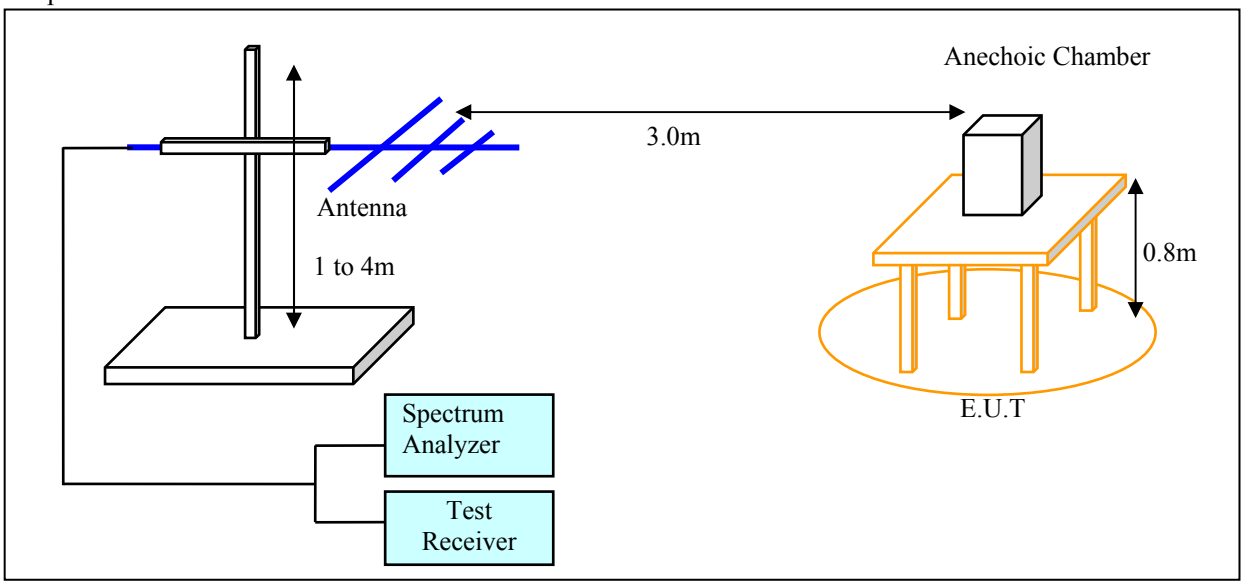
Freq. (MHz)	Reading at 3m (dBuV)	Detector (QP/Ave)	Corr. Factor (dB/m)	Result (dBuV/m)	Limit at 3m (dBuV/m)	Margin (dB)
27.12	9.3	QP	10.0	19.3	69.5	50.2

Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)

2.4 Transmitter radiated spurious emissions between 30 MHz to 1000 MHz

Test setup

Test setup was implemented according to the method of ANSI C63.4: 2003 clause 6 "General requirements for EUT equipment arrangements and operation", clause 8.2.3 and Annex H.4 "Radiated emission measurements setup".



Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 8.2.3.
Exploratory radiated measurements were performed at the measurement distance of 3 meters using broadband antennas and a spectrum analyzer. The EUT was set up in its typical configuration and arrangement, and operated in its various modes.
For each mode of operation required to be tested, the frequency spectrum were monitored. Variations in antenna height between 1 and 4 m, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) were explored to produce the emission that has the highest amplitude relative to the limit.
Based on the exploratory measurement results, the one EUT, cable and wire arrangement, and mode of operation that produces the emission that has the highest amplitude relative to the limit is selected for the final measurement This investigation was performed with the EUT rotated 360° , the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. EUT was placed at three different orientations (X, Y and Z axis) in order to find the worst orientation.

Applicable rule and limitation

§15.209 general requirements

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Measurement Distance (m)	Field Strength (uV/m)	Field Strength (dBuV/m)
30 – 88	3	100	40.0
88 –216	3	150	43.5
216 – 960	3	200	46.0
Above 960	3	500	53.9

In the emission table above, the tighter limit applies at the band edges.
The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector.

Test equipment used (refer to List of utilized test equipment)

AC01	BA04	CL11	PR03	TR04

Test results - Complied with requirement.

Test Data

Tested Date: October 9, 2009

Temperature: 23 ˚C
Humidity: 55 %
Atmos. Press: 1001 hPa

Operating Mode: Continuous Transmission Felica 212 kbps (worst case configuration)

Maximum configuration: EUT – Z-Plane

§15.225(d) Harmonics and spurious emission between 30 MHz to 1000 MHz (refer 15.209)

No.	Frequency [MHz]	Reading [dBuV]	Factor [dB/m]	Loss [dB/m]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna Plariozation
1	189.838	42.6	9.2	9.3	29.5	31.6	43.5	11.9	Hori.
2	216.958	38.7	10.4	9.6	29.5	29.2	46.0	16.8	Hori.
3	325.437	41.9	14.2	11.0	29.6	37.5	46.0	8.5	Hori.
4	352.525	41.4	14.8	11.4	29.7	37.9	46.0	8.1	Hori.
5	379.677	31.9	15.4	11.8	29.7	29.4	46.0	16.6	Vert.
6	**379.677**	**44.0**	**15.4**	**11.8**	**29.7**	**41.5**	**46.0**	**4.5**	**Hori.**
7	488.155	30.2	17.4	14.6	29.7	32.5	46.0	13.5	Hori.

Calculation method

The Correction Factors and RESULT are calculated as followings.

Correction Factor = FACTOR + LOSS – GAIN
(dB/m) (dB/m) (dB) (dB)

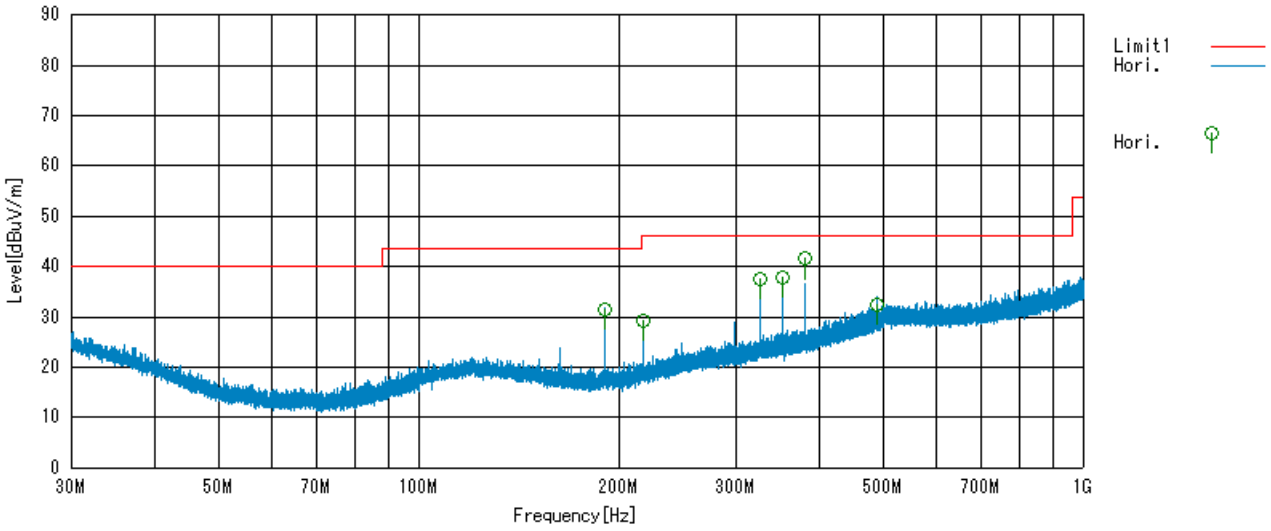
RESULT =READING+ Correction Factor
(dBμV/m) (dBμV) (dB/m)

Sample calculation at 379.677 MHz Horizontal result as follow:

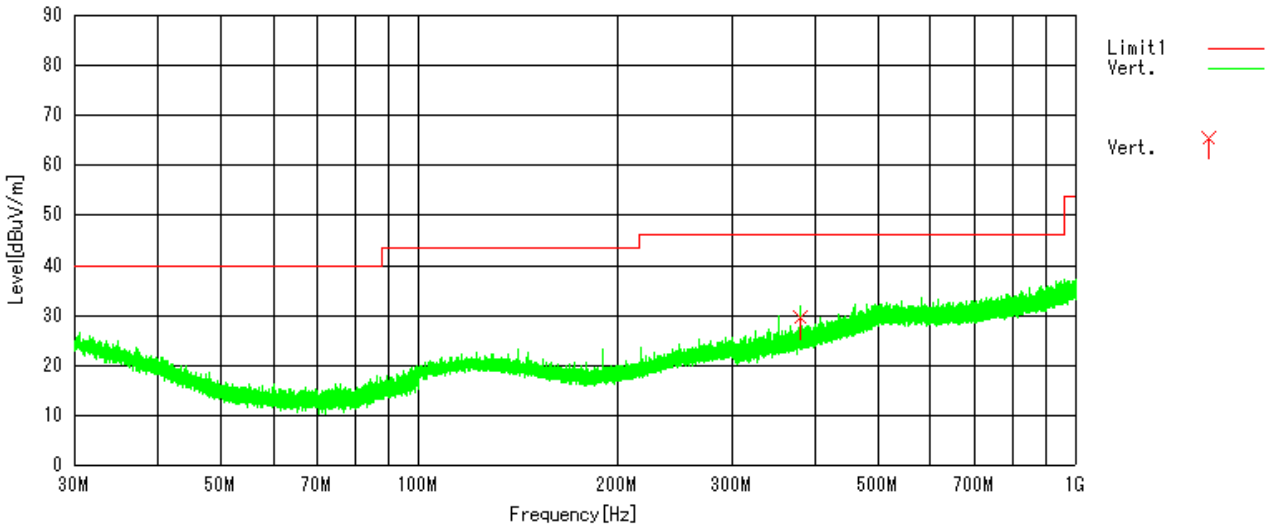
Result (dBuV/m) = Reading + C.F = 44.0 + 15.4 + 11.8 - 29.7 = 41.5
Margin = Limit – Result = 46.0 – 41.5 = 4.5 (dB)

Graphical express of test result (30 MHz-1000 MHz)

Antenna polarization: Horizontal Maximum configuration: EUT – Z-Plane



Antenna polarization: Vertical Maximum configuration: EUT – Z-Plane



2.5 Frequency stability

Test setup
Test setup was implemented according to the method of ANSI C63.4: 2003 clauses 13.1.6.1 "Frequency stability measurements", and Annex H.5 "Frequency measurements".

Test procedure
Measurement procedures were implemented according to the test method of ANSI C63.4: 2003 Annex H5.
Place the de-energized EUT in the temperature test chamber. Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. An antenna was connected to the antenna output connector of the EUT if possible.
The frequency counter was connected to the measurement antenna with a suitable length of coaxial cable.
The environmental chamber set to the highest temperature specified in applicable regulation.
Allow sufficient time (approximately 30 minutes) for the temperature of the chamber to stabilize.
Turn the EUT on and measure the EUT operating frequency at startup, and two, five, and ten minutes after startup.
The measurements were performed that the temperature chamber set to reduce the lowest temperature specified in applicable regulation.

Applicable rule and limitation

§15.225(e) Frequency tolerance

Test items	Variation ranges	Limit
Temperature variations	-10 to +60 degrees	+/- 0.01%

Operating mode:
Continuous transmission mode (Mifare 106 kbps, Felica 212 kbps)
Test Temperature is -10 degree to +60 degree.
All tests were conducted with the test mode provided by the manufacturer.

Test equipment used (refer to List of utilized test equipment)

LP51	TC01	TR04	CL26

Test results - Complied with requirement.

Test Data

Tested Date: October 27, 2009

Temperature: 24 ˚C
Humidity: 48 %
Atmos. Press: 1001 hPa

Operating Mode: Continuous Transmission (Mifare 106 kbps)

Temp. (Degrees)	Voltages (V)	Measured Frequency (MHz)				Worst Deviation (%)	Limit (%)
		Start-up	2 min.	5 min.	10 min.		
Ambient Temperatures Variation							
60	DC 5.00V	13.559696	**13.559688**	**13.559688**	13.559689	**-0.0023**	+/- 0.01
20	DC 5.75V	13.559924	13.559893	**13.559891**	**13.559891**	-0.0008	+/- 0.01
	DC 5.00V	13.559927	13.559895	**13.559893**	**13.559893**	-0.0008	+/- 0.01
	DC 4.25V	13.559927	13.559897	**13.559896**	13.559897	-0.0008	+/- 0.01
0	DC 5.00V	**13.560063**	13.560006	13.560013	13.560018	+0.0005	+/- 0.01
-10	DC 5.00V	**13.560101**	13.560053	13.560057	13.560061	+0.0007	+/- 0.01

Operating Mode: Continuous Transmission (Felica 212 kbps)

Temp. (Degrees)	Voltages (V)	Measured Frequency (MHz)				Worst Deviation (%)	Limit (%)
		Start-up	2 min.	5 min.	10 min.		
Ambient Temperatures Variation							
60	DC 5.00V	**13.559827**	**13.559827**	13.559828	13.559828	-0.0013	+/- 0.01
20	DC 5.75V	13.559972	**13.559952**	**13.559952**	**13.559952**	-0.0004	+/- 0.01
	DC 5.00V	13.559997	13.559954	**13.559953**	**13.559953**	-0.0003	+/- 0.01
	DC 4.25V	13.559978	13.559956	**13.559955**	**13.559955**	-0.0003	+/- 0.01
0	DC 5.00V	**13.560054**	13.560026	13.560039	13.560044	+0.0004	+/- 0.01
-10	DC 5.00V	**13.560081**	13.560056	13.560062	13.560066	+0.0006	+/- 0.01

4 List of utilized test equipment/ calibration

RFT ID No.	Kind of Equipment and Precision	Manufacturer	Model No.	Serial Number	Calibration Date	Calibrated until
AC01	Anechoic Chamber (1st test room)	JSE	203397C	-	2009/4/9	2010/4/30
BA04	Bilogical Antenna	SCHAFFNER	CA2855	2903	2009/1/6	2010/1/31
CL11	Antenna Cable for RE	RFT	-	-	2009/4/13	2010/4/30
CL26	RF Cable 2.0m	SUCOFLEX	SF104	274754/4	2009/6/25	2010/6/30
LN06	LISN	Kyoritsu	KNW-407	8-1773-3	2009/5/26	2010/5/31
CL18	Antenna Cable for CE	RFT	-	-	2009/5/21	2010/5/31
LP01	Loop Antenna	EMCO	6502	3436	2009/6/23	2010/6/30
PL07	Transient Limiter	Agilent Technologies	11947A	3107A04000	2009/1/5	2010/1/31
TR04	Test Receiver (F/W : 4.32)	Rohde & Schwarz	ESCI	100447	2009/9/7	2010/9/30
SA06	Spectrum Analyzer (F/W: 3.60 SP1)	Rohde & Schwarz	FSP40	100071	2008/10/31	2009/10/31
TC01	Temperature Chamber	ESPEC	SH-641	92000964	2008/11/17	2009/11/30
LP51	Test Loop Antenna	Panasonic	VQ-085C	0O2861A122	2008/11/26	2009/11/30
PR03	Pre. Amplifier	Anritsu	MH648A	M41984	2009/5/26	2010/5/31

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.