TEST REPORT

For

RFID Lap time Detector

In conformity with

FCC CFR 47 Part15B

Model: ZRW-05-R/C

Test Item: RFID Lap time Detector

Report No: RY0807H11R2

Issue Date: July 11, 2008

Prepared for

Zixsys Inc.
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Prepared by

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1 General information

1.1 Product description

Test item	: RFID Lap time Detector
Manufacturer	: Zixsys Inc.
Address	: 4thFloor, Akari building 1-312, Kagoharaminami, Kumagaya-shi, Saitama, 360-0847,Japan
Model	: ZRW-05-R/C
Classification	: DoC
Serial numbers	: 0001
Transmitting Frequency	: 13.56 MHz (RFID)
Type of Modulation	: ASK
Receipt date of EUT	: July 7, 2008
Nominal power source voltages	: AC 120V 60Hz

1.2 Test(s) performed/ Summary of test result

Test specification(s)	: FCC CFR 47. Part 15C
Test method(s)	: ANSI C63.4: 2003
Test(s) started	: July 7, 2008
Test(s) completed	: July 11, 2008
Purpose of test(s)	: Verification test
Test mode	: Stand by mode
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
T. Hori

Reviewer : T. Ikegami
T. Ikegami

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, 2007. The description of the test facilities has been filed under registration number 879401 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;

Conducted emission: ±1.9 dB (10 kHz – 150 kHz), ± 1.9 dB (150 kHz – 30 MHz)
Radiated emission (30MHz - 1000MHz): ± 5.7 dB

1.5 Test results

Requirement of;	Section in FCC15	Section in ICES-003	Result	Section in this report
1.5.1 AC Power line conducted emission	15.107	5.3	Complied	2.1
1.5.2 Radiated emission	15.109	5.5	Complied	2.2

1.5.1 AC Power line conducted emissions:

Min. Limit Margin (Q.P.)	47.2	dB	at	13.5597 MHz
Min. Limit Margin (AVE.)	47.2	dB	at	13.5597 MHz
Max. Limit Exceeding	-	dB	at	- MHz

1.5.2 Radiated emission:

Min. Limit Margin	6.8	dB	at	311.890 MHz
Antenna height /Polarization	1.0 m / Horizontal			
EUT Position (CW)	180 degrees			
Max. Limit Exceeding	-	dB	at	- MHz

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	Lap Time Detector	Zixsys Inc.	ZRW-05-R/C	0001	

Support Equipment(s):

	Item	Manufacturer	Model No.	Serial No.	FCC ID
B	Personal computer	DELL	GX-2604	2R9751X	-
C	Monitor	BENQ	FP510	ZPC1-053-0	-
D	Keyboard	DELL	SK-8110	None	-
E	Mouse	DELL	M-SAW34	LZC23120853	-

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	Yes	No	1.5
2	Monitoe cable	BENQ	No	Yes	No	1.5
3	Keyboard cable	DELL	No	No	No	1.5
4	Mouse cable	DELL	No	No	No	1.5

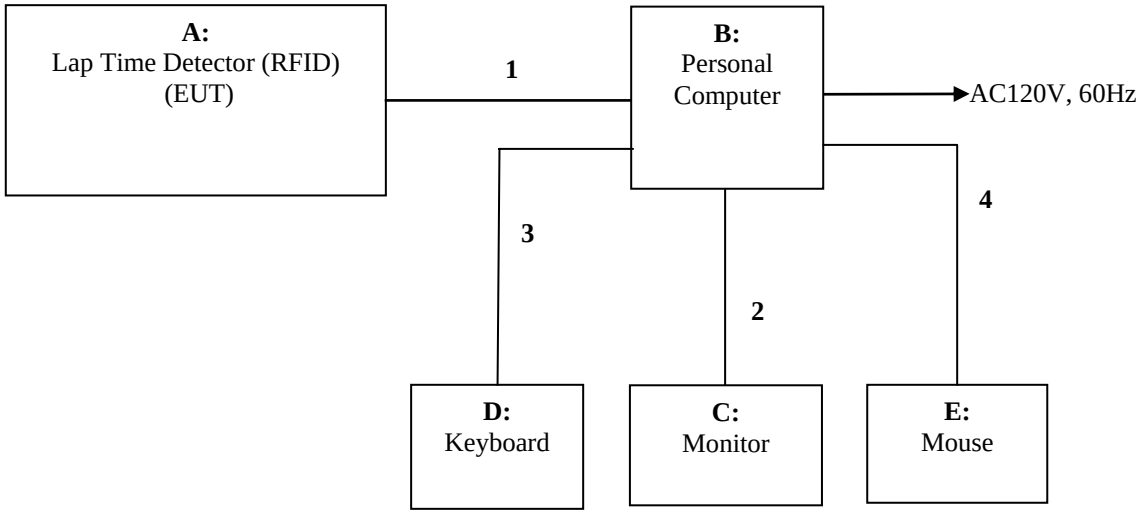
1.6.2 Operating condition:

Operating mode:

Stand by mode

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 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” clause 7 and clause 11 “Measurement of ITE”.

Test procedure
Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 7.2 and clause 11.5 “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

§15.107 (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	CL11

Test results - Complied with requirement.

Test Data

Tested Date: July 10, 2008

Temperature: 24 ˚C
Humidity: 60 %
Atmos. Press: 1008 hPa

Operating Mode: Continuous Transmission (Worst case configuration)

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.1517	52.7	40.3	0.3	53.0	40.6	65.9	55.9	12.9	15.3	Va
2	0.1517	52.5	40.3	0.3	52.8	40.6	65.9	55.9	13.1	15.3	Vb
3	0.1653	50.7	36.0	0.3	51.0	36.3	65.2	55.2	14.2	18.9	Vb
4	0.1721	50.2	41.8	0.3	50.5	42.1	64.9	54.9	14.4	12.8	Va
5	7.3180	36.5	27.9	0.5	37.0	28.4	60.0	50.0	23.0	21.6	Vb
6	7.4620	30.6	20.0	0.5	31.1	20.5	60.0	50.0	28.9	29.5	Va
7	27.1200	36.9	31.1	1.2	38.1	32.3	60.0	50.0	21.9	17.7	Vb
8	27.1200	34.6	31.4	1.2	35.8	32.6	60.0	50.0	24.2	17.4	Va
9	**13.5597**	**46.4**	**46.4**	**0.8**	**47.2**	**47.2**	**60.0**	**50.0**	**12.8**	**2.8**	**Va**
10	13.5597	46.1	46.1	0.8	46.9	46.9	60.0	50.0	13.1	3.1	Vb

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:

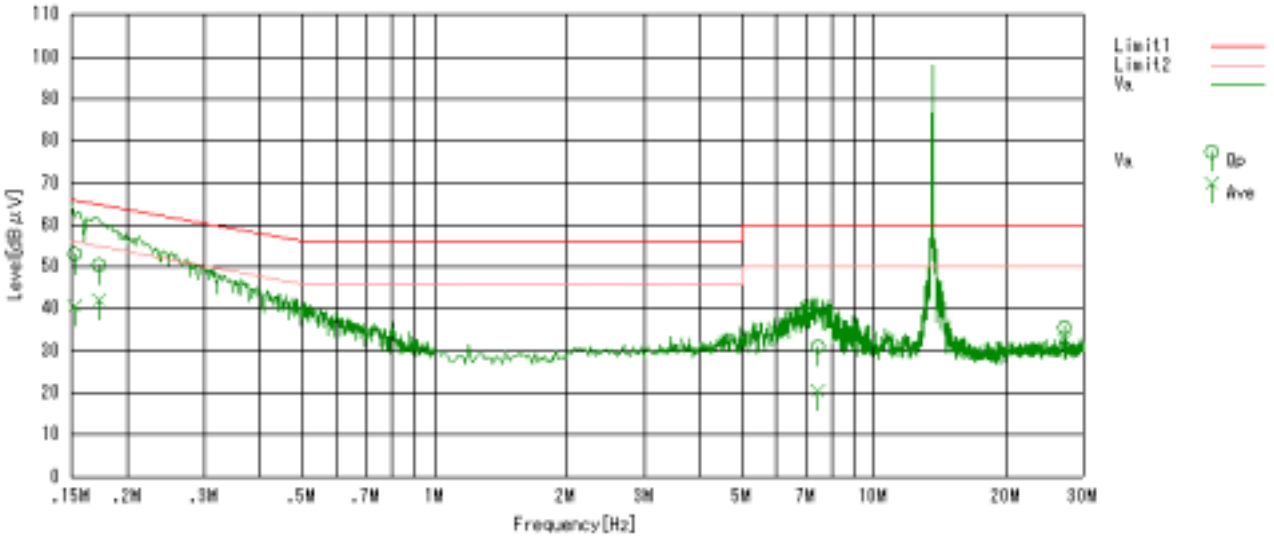
Result = Reading + C. F
where C.F = LISN Factor + Cable Loss [dB]

Sample calculation at 13.5597 MHz Ave. result as follow:

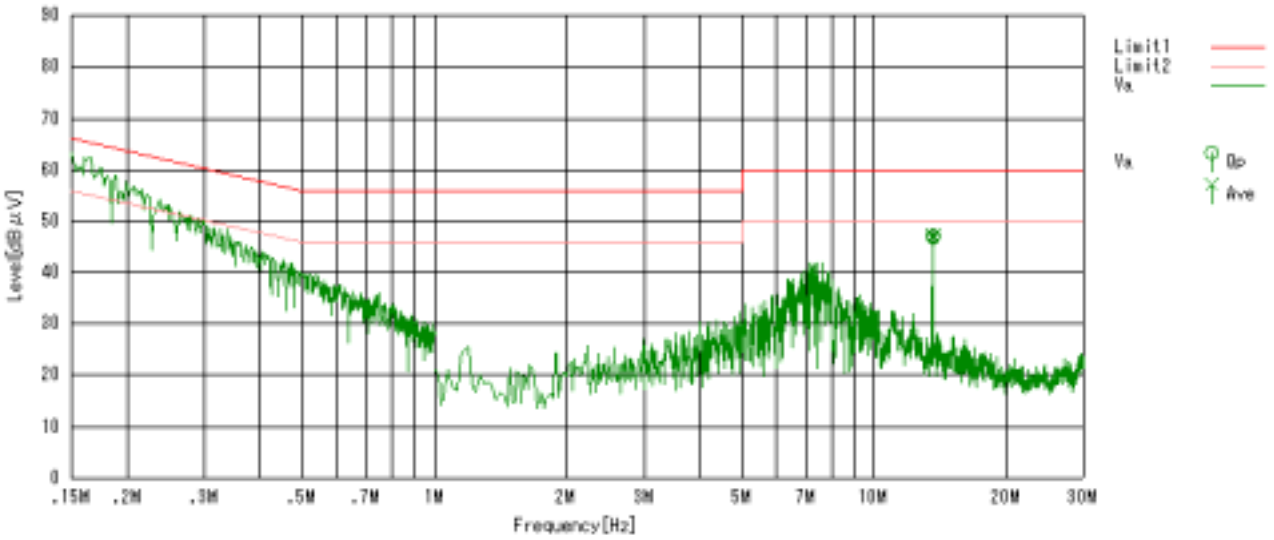
Result (dBuV) = Reading + C.F = 46.4 + 0.8 = 47.2 (dBuV)
Margin = Limit – Result = 50.0 – 47.2 = 2.8 (dBuV)

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

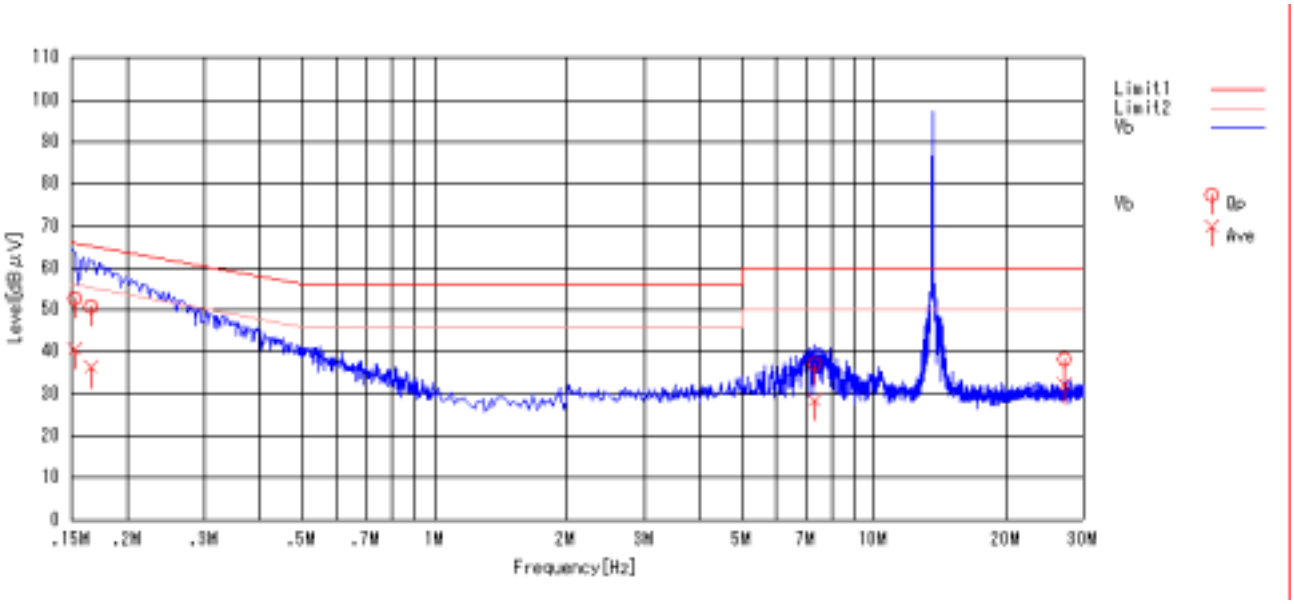
AC Power line conducted emission. (Phase Va)



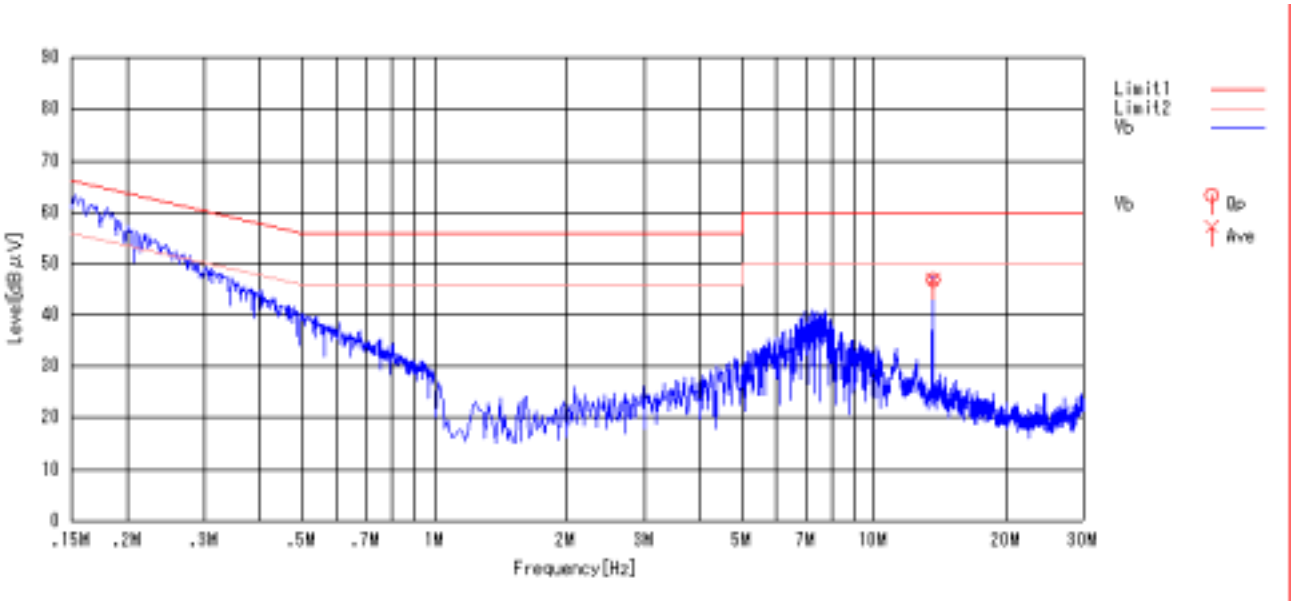
Antenna: 50 ohm Terminated



AC Power line conducted emission. (Phase Vb)



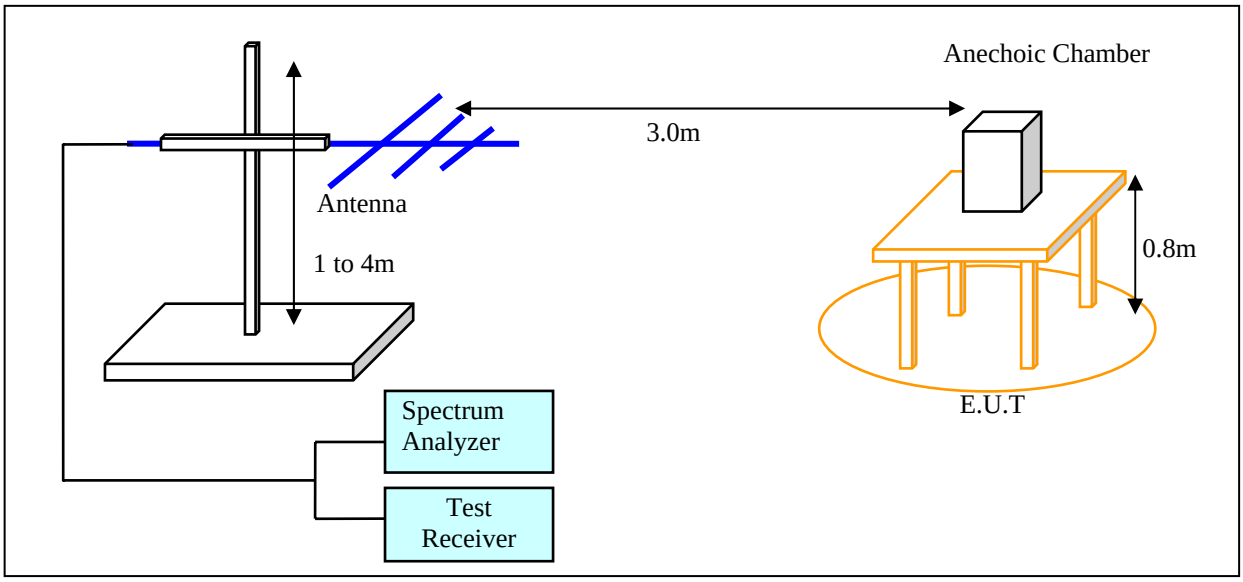
Antenna: 50 ohm Terminated



2.2 Radiated spurious 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”, clause 8“Radiated emission measurements” and clause 11 “Measurement of ITE”.



Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4: 2003 clauses 8.2.3 and clause 11.6 “Radiated emission measurements”.

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 at 3m

§15.109 radiated emission limitation

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	54.0

In the emission table above, the tighter limit applies at the band edges.

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)

BA03	CL11	PR03	AC01	TR04

Test results - Complied with requirement.

Test Data

Tested Date: July 7, 2008
Operating mode: Refer clause 1.6.2
Measurement distance: 3 m

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

Maximum configuration: EUT – Z-Plane

No.	Frequency [MHz]	Reading [dBuV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna Plariozation
1	149.158	45.6	10.8	5.9	29.6	32.7	43.5	10.8	Hori.
2	230.399	46.4	11.1	6.7	29.6	34.6	46.0	11.4	Vert.
3	230.527	49.6	11.1	6.7	29.6	37.8	46.0	8.2	Hori.
4	311.876	47.5	13.6	7.6	29.7	3.09	46.0	7.0	Vert.
5	**311.890**	**47.7**	**13.6**	**7.6**	**29.7**	**39.2**	**46.0**	**6.8**	**Hori.**
6	766.109	32.6	22.4	10.4	29.6	35.8	46.0	10.2	Vert.

Calculation method

The Correction Factors and RESULT are calculated as followings.

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

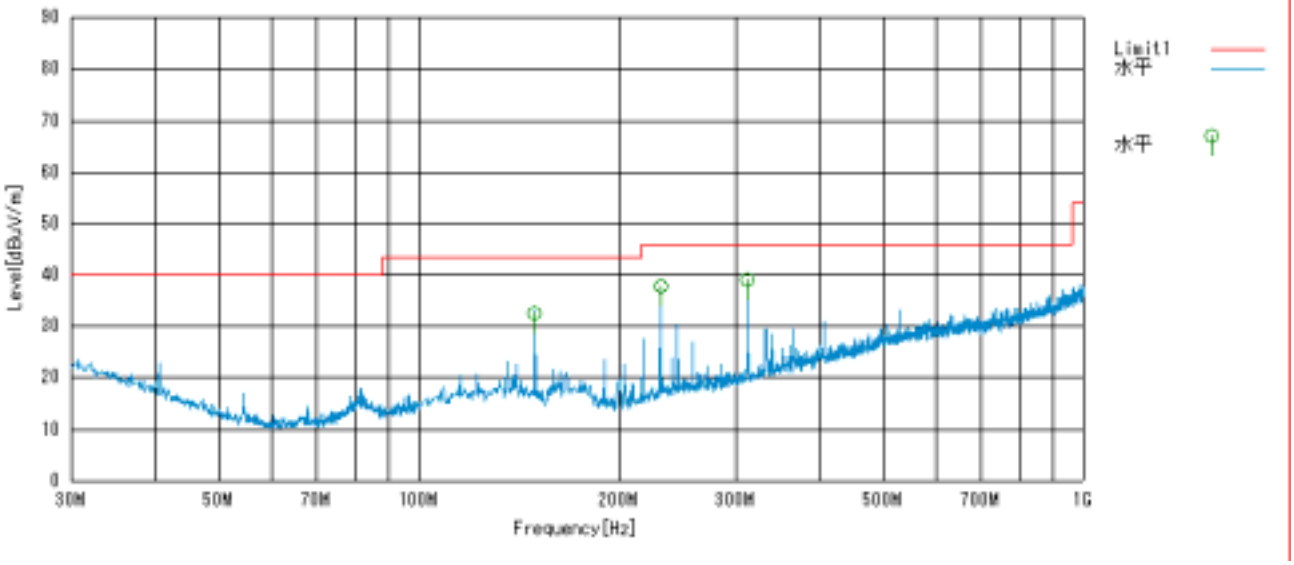
RESULT =READING+ Correction Factor
(dBμV/m) (dBμV/m) (dB)

Sample calculation at 311.890MHz Horizontal result as follow:

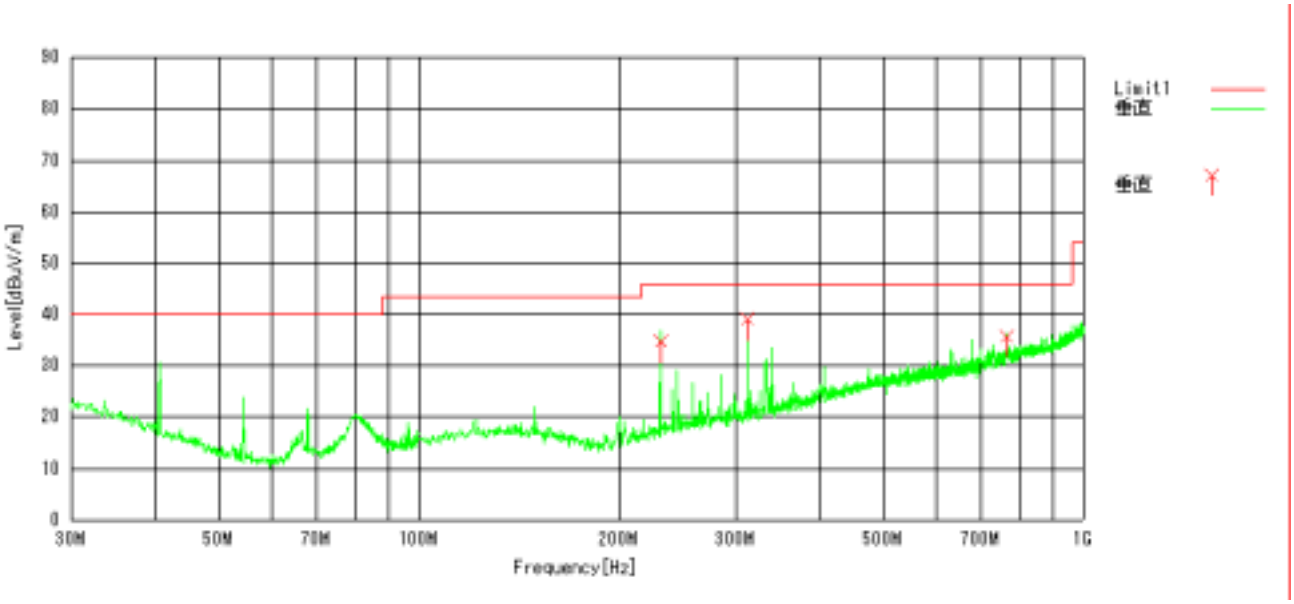
Result (dBuV/m) = Reading + C.F = 47.7 + 13.6 + 7.6 - 29.7 = 39.2
Margin = Limit – Result = 46.0 – 39.2 = 6.8 (dBuV/m)

Test reference chart of radiated emission. (30MHz-1000MHz)

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



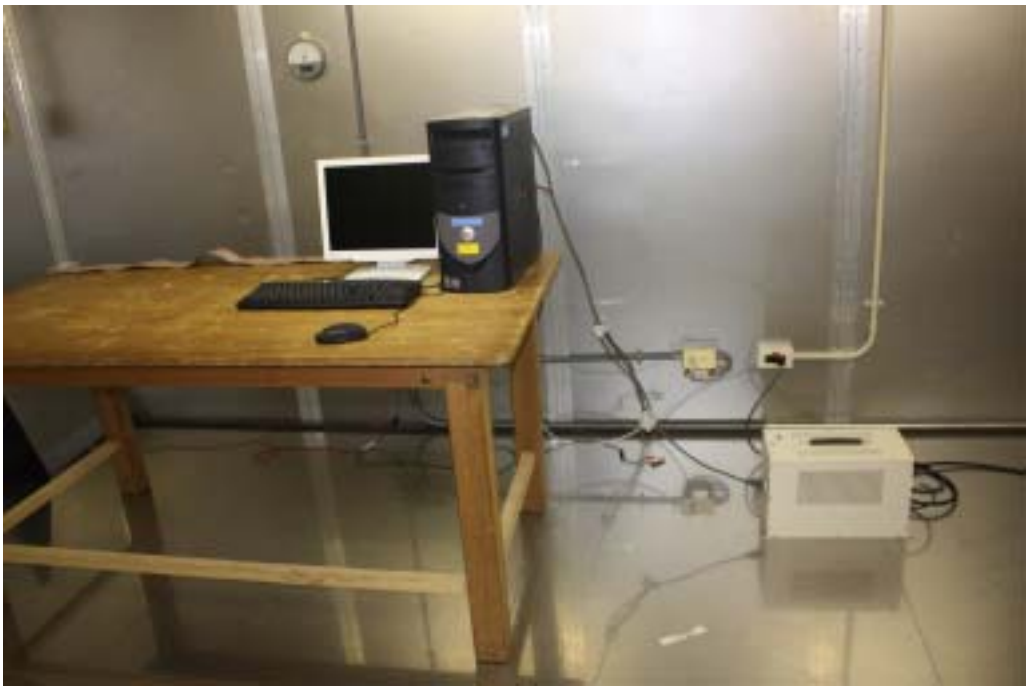
Antenna polarization: Vertical Maximum configuration: EUT – Z-Plane



3 Test setup photographs

3.1 AC power line conducted emissions

Front View

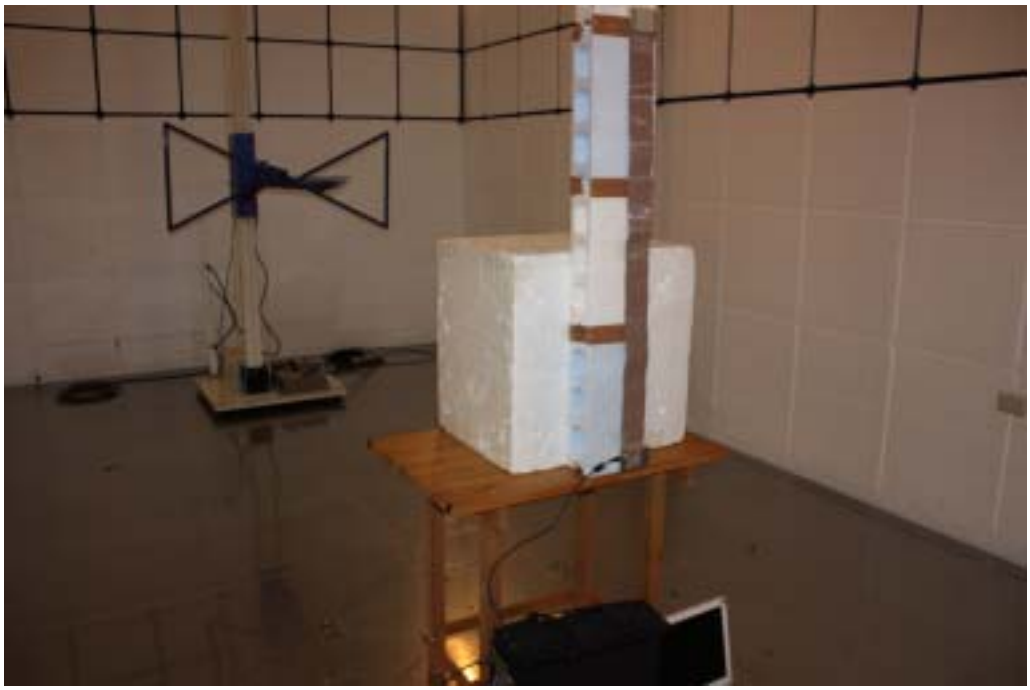


Side View

3.2 Radiated spurious emissions

Front View

Rear View



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	-	2008/5/24	2009/5/23
BA03	Bilogical Antenna	CHASE	CBL6111	1309	2008/5/7	2009/5/6
CL11	Antenna Cable	RFT	-	-	2008/6/11	2009/6/10
PR03	Pre. Amplifier		Anritsu	MH648A	M41984	2008/5/12
TR04	Test Receiver (F/W : 3.82 SP1)	Rohde & Schwarz	ESCI	100447	2007/9/19	2008/9/17

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.