

FCC 47 CFR PART 15 SUBPART C

Product Type : RFID 13.56MHz Wireless Module

Applicant : Dell Inc.

Address : One Dell Way, Round Rock, Texas 78682, U.S.A.

Trade Name : DELL

Model Number : DW RFID1201

Test Specification : FCC 47 CFR PART 15 SUBPART C: Oct., 2010
Canada RSS-210 ISSUE 8: Dec., 2010
Canada RSS-Gen ISSUE 3: Dec., 2010
ANSI C63.4-2009

Receive Date : Oct. 18, 2011

Issue Date : Nov. 02, 2011

Issue by

A Test Lab Techno Corp.
No. 140-1, Changan Street, Bade City,
Taoyuan County 334, Taiwan R.O.C.
Tel : +886-3-2710188 / Fax : +886-3-2710190



Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Oct. 28, 2011	Initial Issue	
01	Nov. 02, 2011	Revise product type and delete regulatory type	Linda Su

Verification of Compliance

Issued Date: 2011/11/02

Product Type : RFID 13.56MHz Wireless Module
Applicant : Dell Inc.
Address : One Dell Way, Round Rock, Texas 78682, U.S.A.
Trade Name : DELL
Model Number : DW RFID1201
FCC ID : E2K-DWRFID1201
IC : 1514B-DWRFID1201
EUT Rated Voltage : DC 3.3 V
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART C: Oct., 2010
Canada RSS-210 ISSUE 8: Dec., 2010
Canada RSS-Gen ISSUE 3: Dec., 2010
ANSI C63.4-2009

Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.

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<http://www.atl-lab.com.tw/e-index.htm>

The above equipment was tested by A Test Lab Techno Corp. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2009 and the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.225. The test results of this report relate only to the tested sample identified in this report.


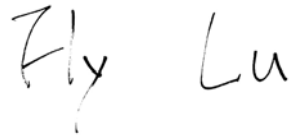
Approved By :  Reviewed By : 
(Manager) (Alex Wu) (Testing Engineer) (Fly Lu)

TABLE OF CONTENTS

1	General Information.....	5
2	EUT Description	6
3	Test Methodology.....	7
3.1.	Mode of Operation.....	7
3.2.	EUT Exercise Software.....	9
3.3.	Configuration of Test System Details.....	10
3.4.	Test Site Environment.....	11
4	Conducted Emission Measurement	12
4.1.	Limit	12
4.2.	Test Instruments	12
4.3.	Test Setup.....	12
4.4.	Test Procedure.....	13
4.5.	Test Result.....	14
5	Radiated Emissions Measurement	18
5.1.	Limit	18
5.2.	Test Instruments	19
5.3.	Setup	20
5.4.	Test Procedure.....	21
5.5.	Test Result.....	22
6	Frequency Stability Measurement.....	30
6.1.	Limit	30
6.2.	Test Setup.....	30
6.3.	Test Instruments	30
6.4.	Test Procedure.....	31
6.5.	Test Result.....	31
7	99% Occupied Bandwidth Measurement.....	33
7.1.	Limit	33
7.2.	Test Setup.....	33
7.3.	Test Instruments	33
7.4.	Test Procedure.....	34
7.5.	Test Result.....	35
7.6.	Test Graphs	35

1 General Information

1.1 Summary of Test Result

Reference		Test	Results	Section
47 CFR Part 15.225	RSS 210 Issue 8			
15.207(a)	RSSGen(7.2.2)	Conducted Emissions Voltage	PASS	4.5
15.225 (a), (b), (c), (d) 15.209	RSS210(A2.6) RSS210(A8.5)	Radiated Emission Limits	PASS	5.5
15.225(e)	RSS210(A2.6)	Frequency Stability	PASS	6.5
-----	-----	99% Occupied Bandwidth	-----	7.5
CFR 47 Part 15.225(2006) / RSS 210 Issue 8 (2010) / ANSI C63.4: 2009 / RSS-Gen Issue 3: 2010				

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

1.2 Measurement Uncertainty

Conducted Emission

The measurement uncertainty is evaluated as ± 2.24 dB.

Radiated Emission

The measurement uncertainty of 30 MHz - 1GHz is evaluated as ± 3.072 dB.

2 EUT Description

Applicant	:	Dell Inc.
Applicant Address	:	One Dell Way, Round Rock, Texas 78682, U.S.A.
Product	:	RFID 13.56MHz Wireless Module
Trade Name	:	DELL
Model Number	:	DW RFID1201
FCC ID	:	E2K-DWRFID1201
IC	:	1514B-DWRFID1201
Frequency Range	:	13.56 MHz
Modulation Type	:	ASK
Number of Channels	:	1 Channel
Antenna Type	:	Coil Antenna
Host Used (1)	:	DELL, P25G Battery: DELL / T54FJ, 11.1Vdc, 60Wh
Host Used (2)	:	DELL, P19F Battery: DELL / M5Y0X, 11.1Vdc, 97Wh
Power Adapter	:	DELL, LA65NS2-01 Input:100-240 Vac, 1.6 A , 50-60 Hz Output: 19.5 Vdc, 3.34A Cable in: Non-Shielded, 0.8 m Cable out: Non-Shielded, 1.8 m with one core

3 Test Methodology

3.1. Mode of Operation

The following test mode(s) were scanned during the preliminary test :

Pre-Test Mode
Mode 1: UMA with TYCO antenna and Gold USH (Host: P25G)
Mode 2: UMA with YAGEO antenna and Gold USH (Host: P25G)
Mode 3: DIS with YAGEO antenna and Gold USH (Host: P25G)
Mode 4: DIS with TYCO antenna and Gold USH (Host: P25G)
Mode 5: UMA with YAGEO antenna and Copper USH (Host: P25G)
Mode 6: UMA with TYCO antenna and Copper USH (Host: P25G)
Mode 7: DIS with YAGEO antenna and Copper USH (Host: P25G)
Mode 8: DIS with TYCO antenna and Copper USH (Host: P25G)
Mode 9: UMA with TYCO antenna and Gold USH (Host: P19F)
Mode 10: UMA with WhaYu antenna and Gold USH (Host: P19F)
Mode 11: DIS with TYCO antenna and Gold USH (Host: P19F)
Mode12: DIS with WhaYu antenna and Gold USH (Host: P19F)
Mode 13: UMA with TYCO antenna and Copper USH (Host: P19F)
Mode 14: UMA with WhaYu antenna and Copper USH (Host: P19F)
Mode 15: DIS with TYCO antenna and Copper USH (Host: P19F)
Mode 16: DIS with WhaYu antenna and Copper USH (Host: P19F)

The preliminary test result is:

Test Mode	Polarization (H/V)	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
Mode 1	Horizontal	13.56	-13.12	84.00	-97.12	Peak
	Vertical	13.56	-15.38	84.00	-99.38	Peak
Mode 2	Horizontal	13.56	-14.77	84.00	-98.77	Peak
	Vertical	13.56	-15.75	84.00	-99.75	Peak
Mode 3	Horizontal	13.56	-15.92	84.00	-99.92	Peak
	Vertical	13.56	-15.12	84.00	-99.12	Peak
Mode 4	Horizontal	13.56	-12.61	84.00	-96.61	Peak
	Vertical	13.56	-23.97	84.00	-107.97	Peak
Mode 5	Horizontal	13.56	-15.55	84.00	-99.55	Peak
	Vertical	13.56	-15.79	84.00	-99.79	Peak
Mode 6	Horizontal	13.56	-15.59	84.00	-99.59	Peak
	Vertical	13.56	-17.69	84.00	-101.69	Peak
Mode 7	Horizontal	13.56	-14.48	84.00	-98.48	Peak
	Vertical	13.56	-16.57	84.00	-100.57	Peak
Mode 8	Horizontal	13.56	-14.12	84.00	-98.12	Peak
	Vertical	13.56	-16.31	84.00	-100.31	Peak
Mode 9	Horizontal	13.56	-7.63	84.00	-91.63	Peak
	Vertical	13.56	-21.29	84.00	-105.29	Peak
Mode 10	Horizontal	13.56	-8.90	84.00	-92.90	Peak
	Vertical	13.56	-20.32	84.00	-104.32	Peak
Mode 11	Horizontal	13.56	-7.86	84.00	-91.86	Peak
	Vertical	13.56	-20.32	84.00	-104.32	Peak
Mode 12	Horizontal	13.56	-10.56	84.00	-94.56	Peak
	Vertical	13.56	-29.30	84.00	-113.30	Peak
Mode 13	Horizontal	13.56	-9.04	84.00	-93.04	Peak
	Vertical	13.56	-23.47	84.00	-107.47	Peak
Mode 14	Horizontal	13.56	-10.71	84.00	-94.71	Peak
	Vertical	13.56	-23.68	84.00	-107.68	Peak
Mode 15	Horizontal	13.56	-8.99	84.00	-92.99	Peak
	Vertical	13.56	-24.20	84.00	-108.20	Peak
Mode 16	Horizontal	13.56	-10.78	84.00	-94.78	Peak
	Vertical	13.56	-25.50	84.00	-109.50	Peak

Note: The level is measured at 1 meter and is converted into result at 30 meter. The converted formula is in section 5.5 of this report.

After the preliminary scan, the following test mode was found to produce the highest emission level :

Final Test Mode
Mode 4: DIS with TYCO Gold Antenna
Mode 9: UMA with TYCO Gold Antenna

Then, the above highest fundamental level mode of the configuration of the EUT and antenna was chosen for all final test items.

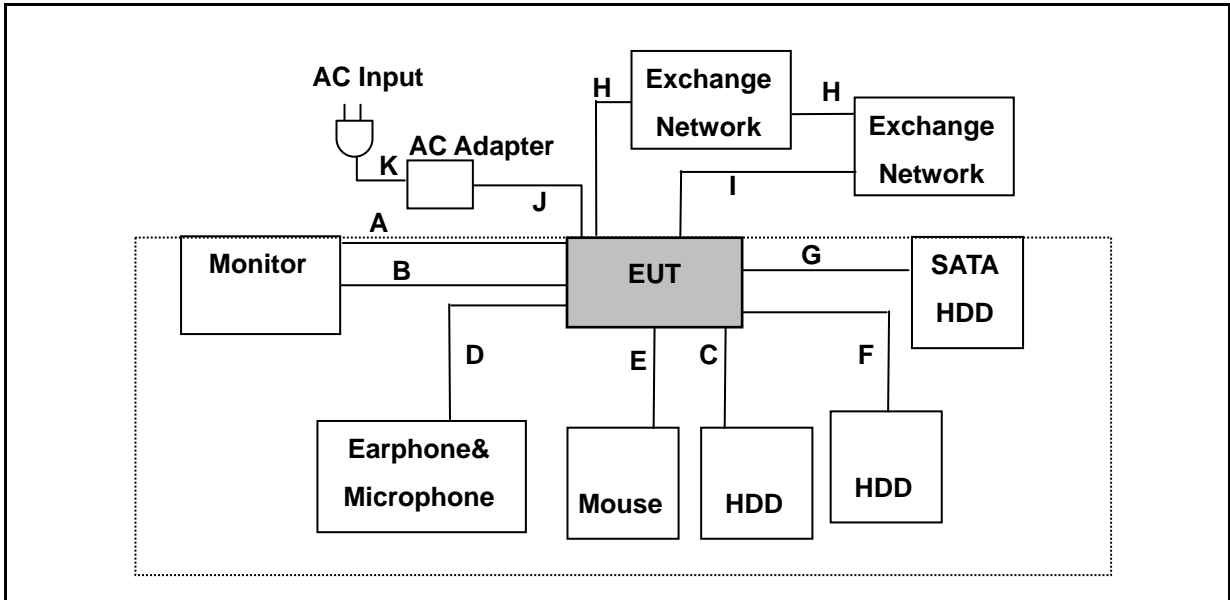
ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation.

3.2. EUT Exercise Software

1.	Setup the EUT as shown on 3.3.
2.	Turn on the power of all equipment.
3.	The EUT will start to operate function.

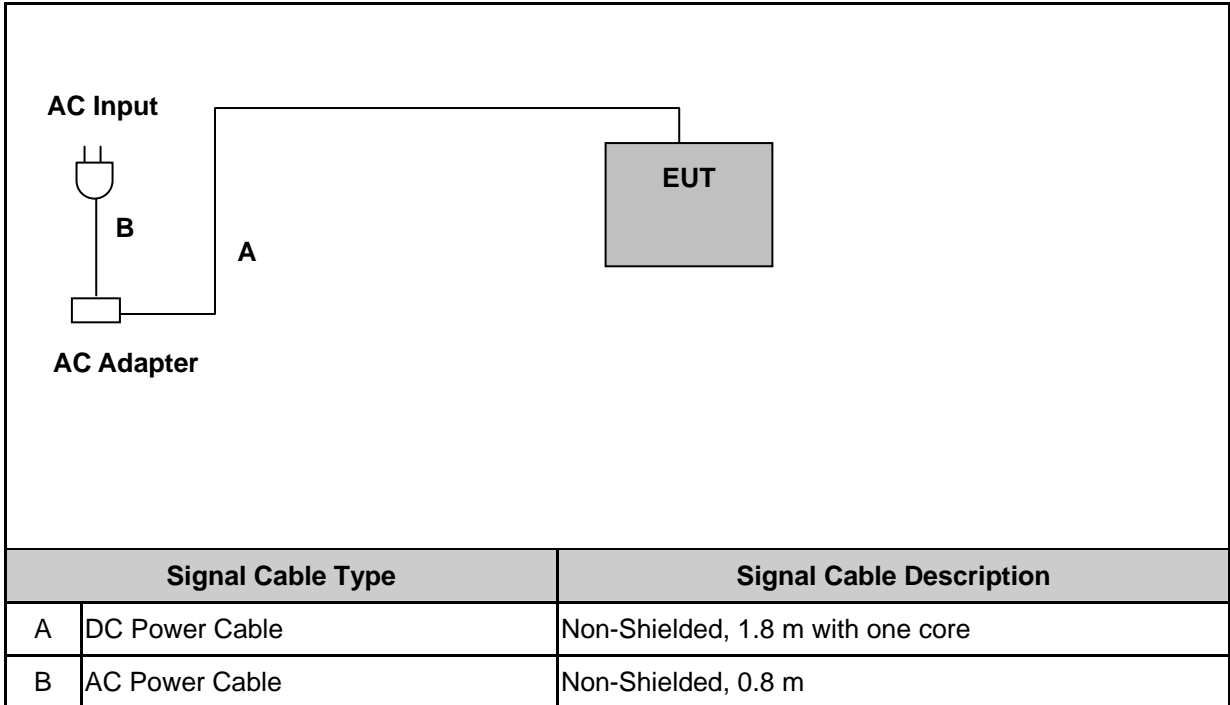
3.3. Configuration of Test System Details

Conducted Emission



Signal Cable Type		Signal Cable Description
A	D-SUB Cable	Shielded, 1.8 m with two cores
B	HDMI Cable	Non-Shielded, 1.8 m
C	USB Cable	Shielded, 2.0 m
D	Earphone & Microphone Cable	Non-Shielded, 1.8 m
E	USB Cable	Shielded, 1.8 m
F	USB Cable	Shielded, 1.5 m with two cores
G	E-SATA Cable	Shielded, 0.8 m
H	Telecom Cable	Non-Shielded, 3.0 m
I	LAN Cable	Non-Shielded, 3.0 m
J	DC Power Cable	Non-Shielded, 1.8 m with one core
K	AC Power Cable	Non-Shielded, 0.8 m

Radiated Emission



3.4. Test Site Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950

4 Conducted Emission Measurement

4.1. Limit

Frequency (MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

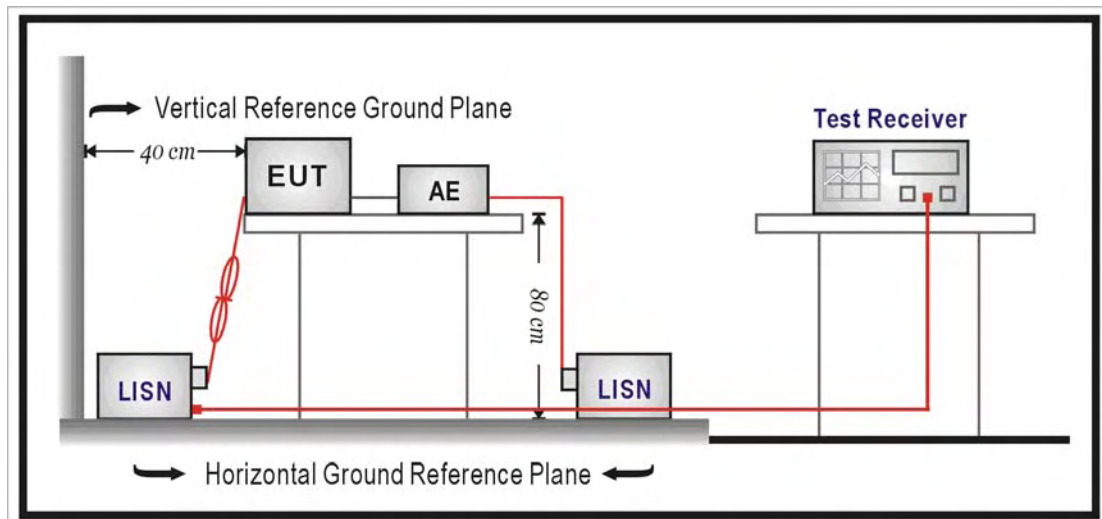
4.2. Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	06/30/2011	(1)
LISN	R&S	ENV216	101040	03/04/2011	(1)
LISN	R&S	ENV216	101041	03/04/2011	(1)
Test Site	ATL	TE05	TE05	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

4.3. Test Setup



4.4. Test Procedure

The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and EMCO Model 3162/2 SH Line Impedance Stabilization Networks (LISN). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

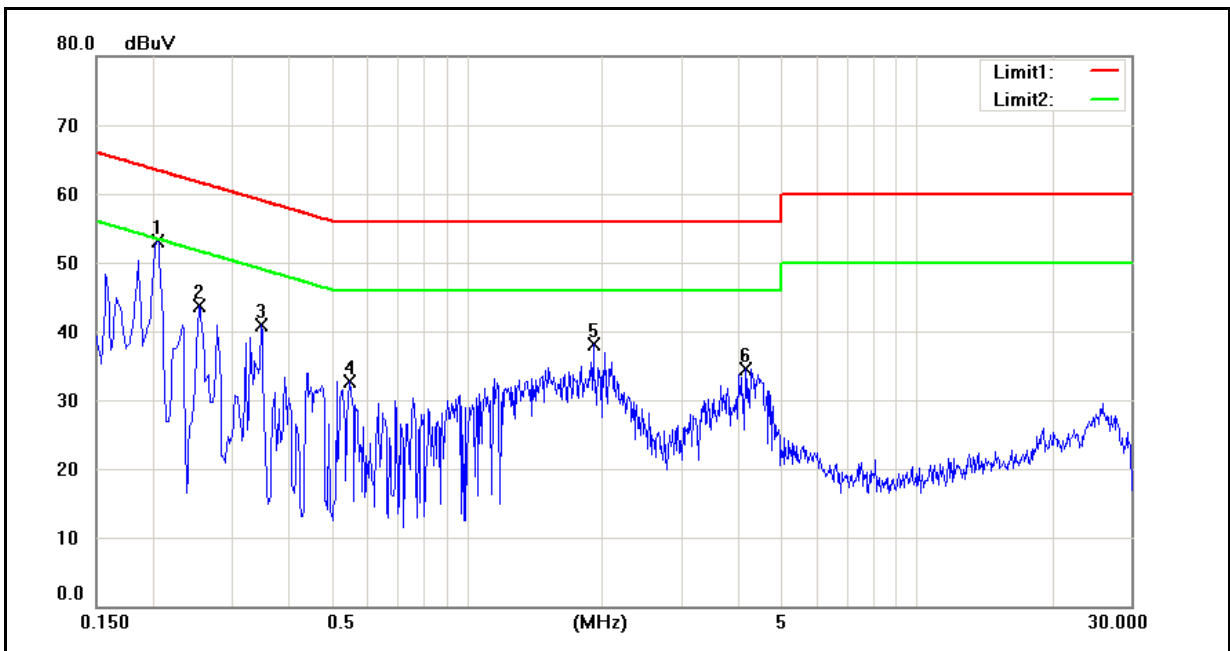
The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 4.1.

Spectrum Analyzer Settings

Measurement Frequency	Preliminary Peak Scan		Final Detection	
	Resolution Bandwidth	Video Bandwidth	Quasi-Peak Bandwidth	Average Video Bandwidth
9kHz to 150kHz	10kHz	10kHz	200Hz	10Hz
150kHz to 30MHz	100kHz	100kHz	9kHz	10Hz

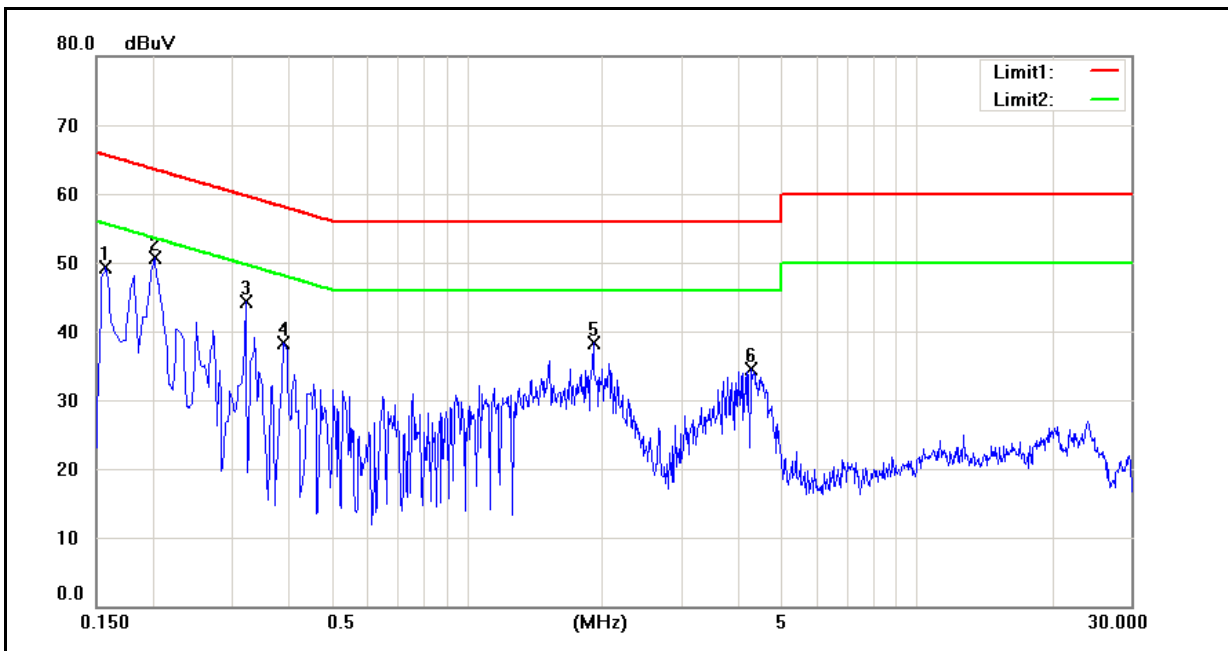
4.5. Test Result

Standard:	FCC Part 15C	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	22(°C)/58%RH
Mode:	Mode 4	Date:	10/28/2011
		Test By:	Fly Lu
Description:			



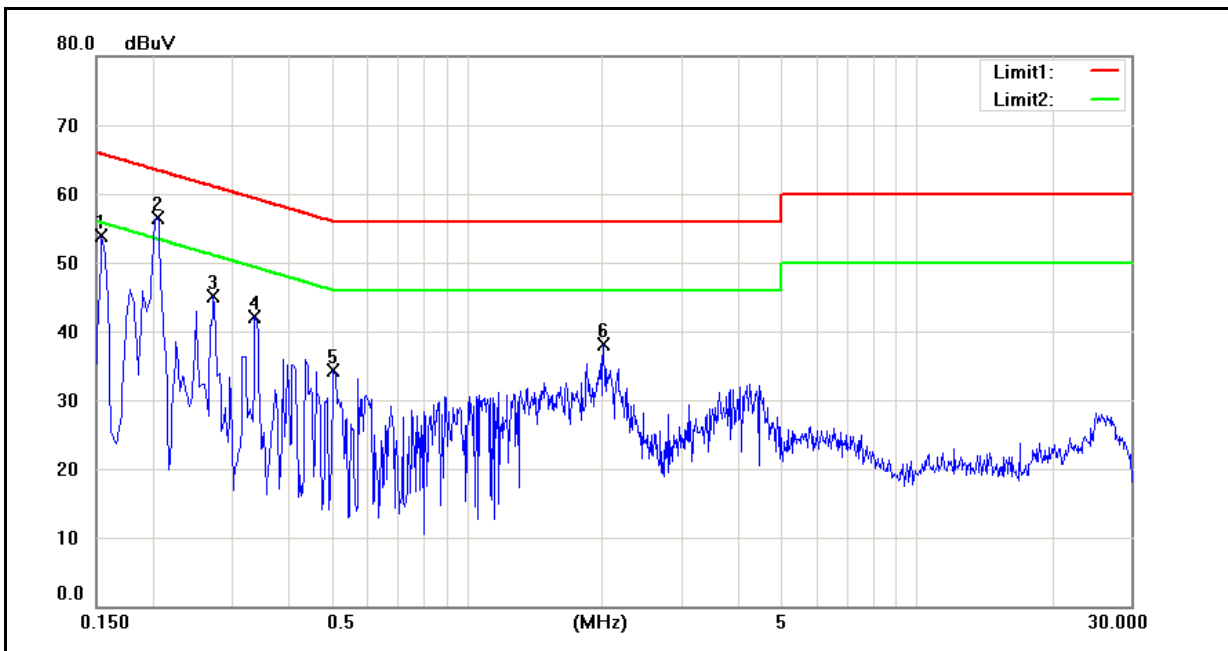
No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.2060	40.12	25.03	10.05	50.17	35.08	63.37	53.37	-13.20	-18.29	Pass
2	0.2540	31.98	17.40	10.03	42.01	27.43	61.63	51.63	-19.62	-24.20	Pass
3	0.3500	24.37	8.57	9.99	34.36	18.56	58.96	48.96	-24.60	-30.40	Pass
4	0.5500	20.75	8.24	9.91	30.66	18.15	56.00	46.00	-25.34	-27.85	Pass
5	1.9100	24.53	21.36	9.68	34.21	31.04	56.00	46.00	-21.79	-14.96	Pass
6	4.1700	18.92	3.86	9.81	28.73	13.67	56.00	46.00	-27.27	-32.33	Pass

Standard:	FCC Part 15C	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	22(°C)/58%RH
Mode:	Mode 4	Date:	10/28/2011
		Test By:	Fly Lu
Description:			



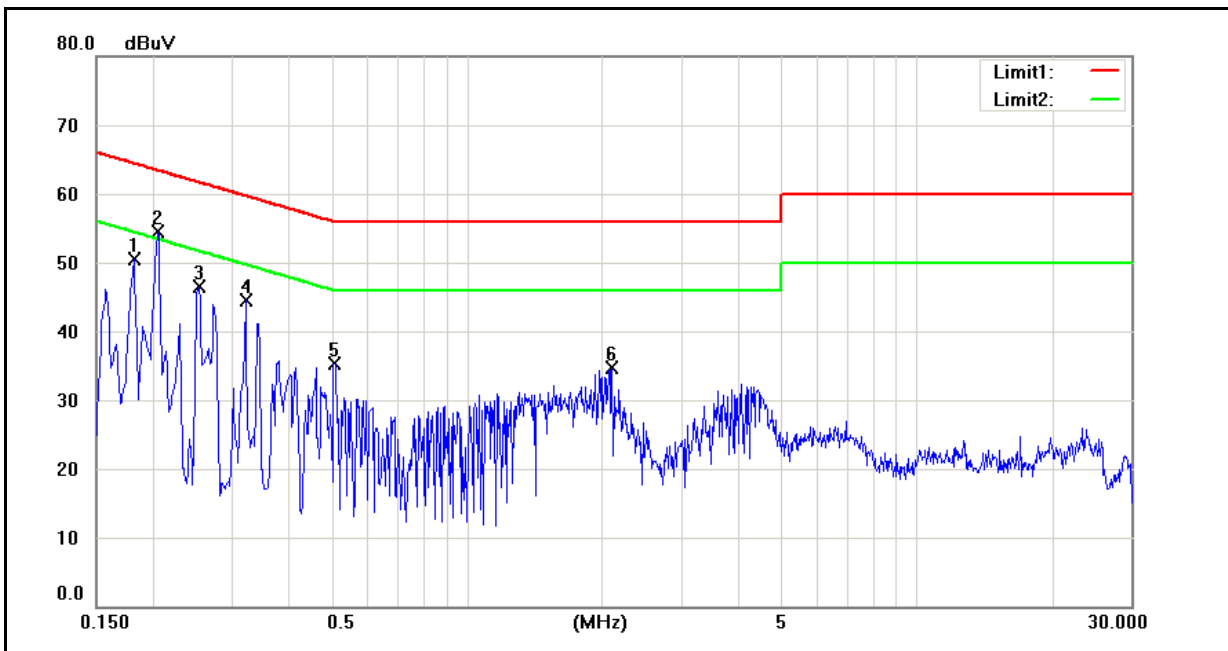
No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1580	32.68	16.37	10.15	42.83	26.52	65.57	55.57	-22.74	-29.05	Pass
2	0.2020	40.73	26.77	10.13	50.86	36.90	63.53	53.53	-12.67	-16.63	Pass
3	0.3220	31.57	18.01	10.08	41.65	28.09	59.66	49.66	-18.01	-21.57	Pass
4	0.3900	23.70	8.59	10.05	33.75	18.64	58.06	48.06	-24.31	-29.42	Pass
5	1.9100	24.23	21.32	9.74	33.97	31.06	56.00	46.00	-22.03	-14.94	Pass
6	4.3100	19.31	2.84	9.88	29.19	12.72	56.00	46.00	-26.81	-33.28	Pass

Standard:	FCC Part 15C	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	22(°C)/58%RH
Mode:	Mode 9	Date:	10/28/2011
		Test By:	Fly Lu
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1540	33.79	14.76	10.07	43.86	24.83	65.78	55.78	-21.92	-30.95	Pass
2	0.2060	44.04	27.47	10.05	54.09	37.52	63.37	53.37	-9.28	-15.85	Pass
3	0.2740	33.65	17.37	10.02	43.67	27.39	61.00	51.00	-17.33	-23.61	Pass
4	0.3380	28.88	12.63	10.00	38.88	22.63	59.25	49.25	-20.37	-26.62	Pass
5	0.5060	19.68	6.77	9.93	29.61	16.70	56.00	46.00	-26.39	-29.30	Pass
6	2.0180	18.97	11.93	9.68	28.65	21.61	56.00	46.00	-27.35	-24.39	Pass

Standard:	FCC Part 15C	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	22(°C)/58%RH
Mode:	Mode 9	Date:	10/28/2011
		Test By:	Fly Lu
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1820	30.57	13.23	10.14	40.71	23.37	64.39	54.39	-23.68	-31.02	Pass
2	0.2060	43.13	26.66	10.13	53.26	36.79	63.37	53.37	-10.11	-16.58	Pass
3	0.2540	34.77	17.20	10.11	44.88	27.31	61.63	51.63	-16.75	-24.32	Pass
4	0.3220	27.80	11.13	10.08	37.88	21.21	59.66	49.66	-21.78	-28.45	Pass
5	0.5100	20.38	7.44	10.01	30.39	17.45	56.00	46.00	-25.61	-28.55	Pass
6	2.1060	19.69	10.17	9.75	29.44	19.92	56.00	46.00	-26.56	-26.08	Pass

5 Radiated Emissions Measurement

5.1. Limit

According to §15.225,

- (a) The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolt / meter at 30 meters.
- (b) Within the bands 13.410 – 13.553 MHz and 13.567 -13.710 MHz, the field strength of any emissions shall not exceed 334 microvolt / meter at 30 meters.
- (c) Within the bands 13.110 – 13.410 MHz and 13.710 – 14.010 MHz the field strength of any emissions shall not exceed 106 microvolt / meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110 – 14.010 MHz and shall not exceed the general radiated emission limits in §15.209.

According to §15.225(a), 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 ($\mu\text{V}/\text{m}$ at meter)	Measurement Distance (meter)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

5.2. Test Instruments

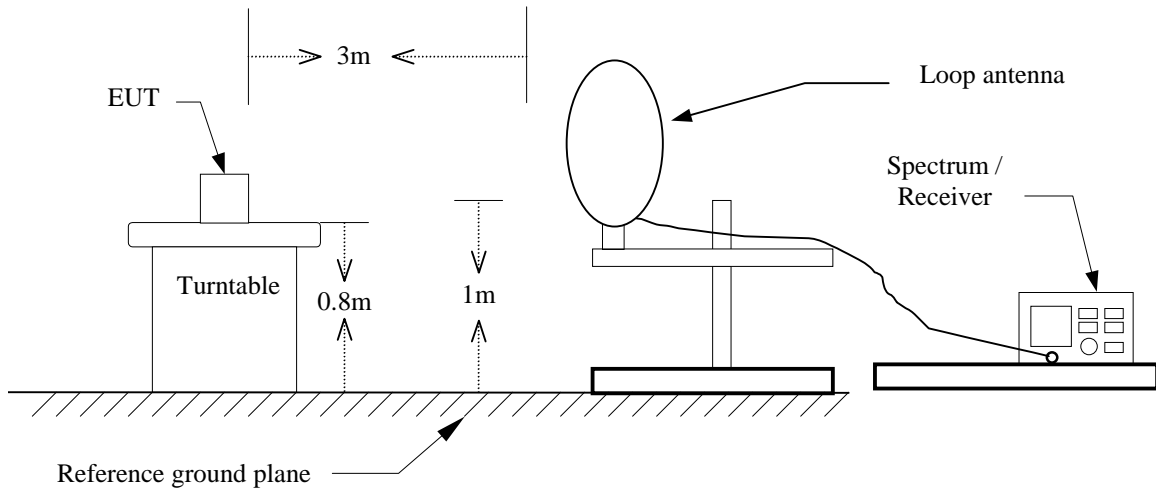
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/18/2011	(2)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/18/2011	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/23/2011	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/23/2011	(1)
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	07/29/2011	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/29/2011	(1)
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	06/28/2011	(1)
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	08/14/2009	(3)
Test Site	ATL	TE01	888001	12/24/2010	(1)

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years. ⁽³⁾ Calibration period 3 years.

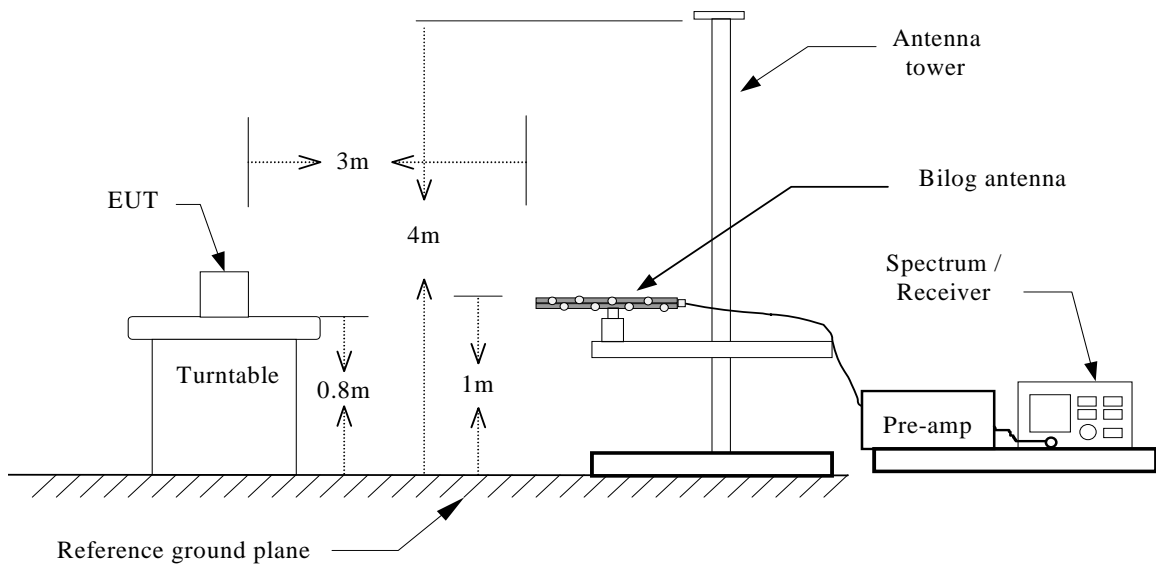
NOTE: N.C.R. = No Calibration Request.

5.3. Setup

9kHz ~ 30MHz



30MHz ~ 1 GHz



5.4. Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 1 GHz is investigated.

A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Biconilog Antenna (mode VULB9163) at 3 Meter. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

The actual field intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

$$(1) \text{ Amplitude (dBuV/m) = FI (dBuV) +AF (dBuV) +CL (dBuV)-Gain (dB)}$$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

$$(2) \text{ Actual Amplitude (dBuV/m) = Amplitude (dBuV)-Dis(dB)}$$

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

5.5. Test Result

Fundamental Test Result:

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	10/15/2011
Ant.Polar.:	Horizontal	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	13.56	-37.40	13.43	-23.97	84.00	-107.97	peak

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4	Date:	10/15/2011
Ant.Polar.:	Vertical	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	13.56	-26.04	13.43	-12.61	84.00	-96.61	peak

Note: The level is measured at 1 meter and is converted into result at 30 meter.

The converted formula listed below:

Measure result (1 meter distance): a

Compute result (30 meter distance): A

$$A = a + (40 \cdot \log(1/30))$$

$$\text{ex. } a = 21.68 \text{ dBuV, } A = 21.68 + (40 \cdot \log(1/30)) = -37.40 \text{ dBuV}$$

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 9	Date:	10/15/2011
Ant.Polar.:	Horizontal	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	13.56	-34.72	13.43	-21.29	84.00	-105.29	peak

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 9	Date:	10/15/2011
Ant.Polar.:	Vertical	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	13.56	-21.06	13.43	-7.63	84.00	-91.63	peak

Note: The level is measured at 1 meter and is converted into result at 30 meter.

The converted formula listed below:

Measure result (1 meter distance): a

Compute result (30 meter distance): A

$$A = a + (40 \cdot \log(1/30))$$

ex. a = 24.36 dBuV, A = 24.36 + (40 * log(1/30)) = -34.72dBuV

Below 1 GHz Test Results:

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4 (Transmitter mode)	Date:	10/16/2011
Ant.Polar.:	Horizontal	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0090	-54.44	17.00	-37.44	48.52	-85.96	QP
2	0.1590	-56.40	12.07	-44.33	23.58	-67.91	QP
3	1.1786	-43.98	14.96	-29.02	26.18	-55.20	QP
4	3.1581	-52.56	14.76	-37.80	29.54	-67.34	QP
5	7.3868	-59.45	15.64	-43.81	29.54	-73.35	QP
6	17.2838	-48.94	13.66	-35.28	29.54	-64.82	QP

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4 (Transmitter mode)	Date:	10/16/2011
Ant.Polar.:	Vertical	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0090	-50.82	17.00	-33.82	48.52	-82.34	QP
2	0.6388	-34.33	13.78	-20.55	31.50	-52.05	QP
3	2.7682	-51.13	14.83	-36.30	29.54	-65.84	QP
4	6.2171	-58.23	15.48	-42.75	29.54	-72.29	QP
5	17.1340	-52.48	13.63	-38.85	29.54	-68.39	QP
6	19.1133	-59.64	14.05	-45.59	29.54	-75.13	QP

Note: The level is measured at 1 meter and is converted into result at 300 or 30 meter.

The converted formula listed below:

Measure result (1 meter distance): a

Compute result (30 or 300 meter distance): A

$A = a + (40 \cdot \log(1/300 \text{ or } 1/30))$

ex. a (0.0090 MHz) = 44.64 dBuV, $A = 44.64 + (40 \cdot \log(1/300)) = -54.44 \text{ dBuV}$

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4 (Transmitter mode)	Date:	10/16/2011
Ant.Polar.:	Horizontal	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	92.5000	42.34	-15.36	26.98	43.50	-16.52	QP
2	184.5000	51.87	-14.86	37.01	43.50	-6.49	QP
3	212.5000	51.47	-13.91	37.56	43.50	-5.94	QP
4	295.5000	48.91	-10.66	38.25	46.00	-7.75	QP
5	356.5000	40.75	-8.77	31.98	46.00	-14.02	QP
6	401.0000	38.09	-8.69	29.40	46.00	-16.60	QP

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4 (Transmitter mode)	Date:	10/16/2011
Ant.Polar.:	Vertical	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	68.5000	42.36	-15.78	26.58	40.00	-13.42	QP
2	93.0000	48.92	-15.24	33.68	43.50	-9.82	QP
3	564.5000	35.66	-5.96	29.70	46.00	-16.30	QP
4	630.5000	33.27	-4.44	28.83	46.00	-17.17	QP
5	675.0000	36.51	-3.80	32.71	46.00	-13.29	QP
6	765.0000	32.79	-2.06	30.73	46.00	-15.27	QP

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4 (Receiver mode)	Date:	10/16/2011
Ant.Polar.:	Horizontal	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	92.5000	42.34	-15.36	26.98	43.50	-16.52	QP
2	295.5000	46.91	-10.66	36.25	46.00	-9.75	QP
3	356.5000	40.75	-8.77	31.98	46.00	-14.02	QP
4	538.0000	28.83	-6.63	22.20	46.00	-23.80	QP
5	698.5000	32.34	-3.41	28.93	46.00	-17.07	QP
6	765.0000	34.16	-2.06	32.10	46.00	-13.90	QP

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 4 (Receiver mode)	Date:	10/16/2011
Ant.Polar.:	Vertical	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	68.5000	42.36	-15.78	26.58	40.00	-13.42	QP
2	299.5000	34.24	-10.54	23.70	46.00	-22.30	QP
3	394.5000	32.66	-8.70	23.96	46.00	-22.04	QP
4	549.0000	29.32	-6.37	22.95	46.00	-23.05	QP
5	597.5000	29.70	-5.01	24.69	46.00	-21.31	QP
6	675.0000	36.51	-3.80	32.71	46.00	-13.29	QP

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 9 (Transmitter mode)	Date:	10/15/2011
Ant.Polar.:	Horizontal	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0090	-59.86	17.00	-42.86	48.52	-91.38	QP
2	0.6088	-54.94	13.67	-41.27	31.91	-73.18	QP
3	2.2583	-62.64	15.02	-47.62	29.54	-77.16	QP
4	4.9875	-65.14	15.63	-49.51	29.54	-79.05	QP
5	16.4141	-59.64	13.47	-46.17	29.54	-75.71	QP
6	17.0138	-60.14	13.60	-46.54	29.54	-76.08	QP

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 9 (Transmitter mode)	Date:	10/15/2011
Ant.Polar.:	Vertical	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0090	-50.08	17.00	-33.08	48.52	-81.60	QP
2	1.0287	-46.48	14.92	-31.56	27.36	-58.92	QP
3	5.8572	-57.06	15.42	-41.64	29.54	-71.18	QP
4	8.7664	-59.00	15.35	-43.65	29.54	-73.19	QP
5	15.5443	-56.91	13.28	-43.63	29.54	-73.17	QP
6	17.3438	-57.41	13.67	-43.74	29.54	-73.28	QP

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 9 (Transmitter mode)	Date:	10/15/2011
Ant.Polar.:	Horizontal	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	92.5000	40.11	-15.36	24.75	43.50	-18.75	QP
2	213.0000	37.77	-13.89	23.88	43.50	-19.62	QP
3	304.5000	44.00	-10.38	33.62	46.00	-12.38	QP
4	343.5000	38.52	-9.01	29.51	46.00	-16.49	QP
5	403.5000	35.34	-8.65	26.69	46.00	-19.31	QP
6	699.5000	26.18	-3.39	22.79	46.00	-23.21	QP

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 9 (Transmitter mode)	Date:	10/15/2011
Ant.Polar.:	Vertical	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	92.5000	47.62	-15.36	32.26	43.50	-11.24	QP
2	344.5000	40.28	-8.99	31.29	46.00	-14.71	QP
3	405.0000	47.77	-8.65	39.12	46.00	-6.88	QP
4	432.0000	36.01	-8.30	27.71	46.00	-18.29	QP
5	538.0000	34.73	-6.49	28.24	46.00	-17.76	QP
6	812.5000	25.74	-1.38	24.36	46.00	-21.64	QP

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 9 (Receiver mode)	Date:	10/16/2011
Ant.Polar.:	Horizontal	Test By:	Fly Lu

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	66.5000	33.18	-15.00	18.18	40.00	-21.82	QP
2	168.0000	36.28	-16.08	20.20	43.50	-23.30	QP
3	439.0000	31.76	-8.18	23.58	46.00	-22.42	QP
4	624.0000	25.58	-4.55	21.03	46.00	-24.97	QP
5	736.0000	27.44	-2.60	24.84	46.00	-21.16	QP
6	892.0000	24.86	-0.02	24.84	46.00	-21.16	QP

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	DW RFID1201	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	Mode 9 (Receiver mode)	Date:	10/16/2011
Ant.Polar.:	Vertical	Test By:	Fly Lu

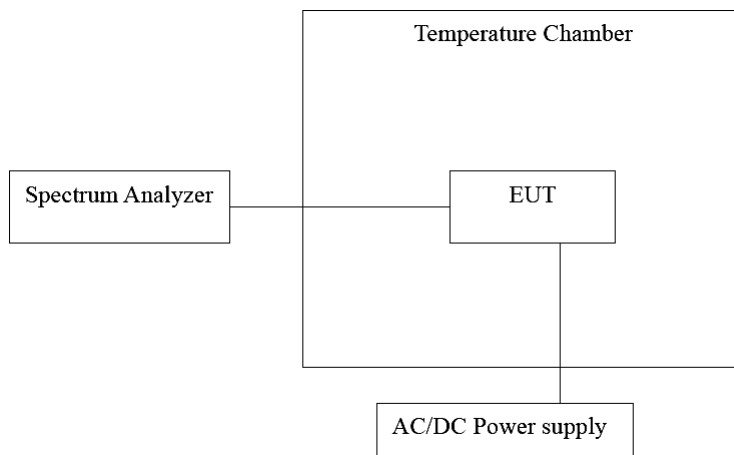
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	69.5000	42.44	-16.18	26.26	40.00	-13.74	QP
2	142.5000	42.09	-17.28	24.81	43.50	-18.69	QP
3	186.0000	34.48	-14.75	19.73	43.50	-23.77	QP
4	323.0000	36.64	-9.75	26.89	46.00	-19.11	QP
5	432.0000	36.01	-8.30	27.71	46.00	-18.29	QP
6	498.5000	32.39	-6.93	25.46	46.00	-20.54	QP

6 Frequency Stability Measurement

6.1. Limit

According to §15.207(e), the frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

6.2. Test Setup



6.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/07/2011	(1)
Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	08/24/2011	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

6.4. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the environment into appropriate environment.
4. Set the spectrum analyzer as RBW=1kHz, VBW = RBW, Span = 200kHz, Sweep = auto.
5. Mark the peak frequency and measure the frequency tolerance using frequency counter function.
6. Repeat until all the results are investigated.

6.5. Test Result

Temperature Variations

Model Number	DW RFID1201					
Mode	Mode 4					
Date of Test	10/25/2011			Test Site	TE02	
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (%)	Limit (±%)	Result (Pass/Fail)
-20	120	13.5603	300.0000	0.0022	±0.01	Pass
-10		13.5605	500.0000	0.0037	±0.01	Pass
0		13.5602	200.0000	0.0015	±0.01	Pass
10		13.5602	200.0000	0.0015	±0.01	Pass
20		13.5601	100.0000	0.0007	±0.01	Pass
30		13.5603	300.0000	0.0022	±0.01	Pass
40		13.5604	400.0000	0.0029	±0.01	Pass
50		13.5602	200.0000	0.0015	±0.01	Pass

Voltage Variations

Model Number	DW RFID1201					
Mode	Mode 4					
Date of Test	10/25/2011			Test Site	TE02	
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (%)	Limit (±%)	Result (Pass/Fail)
20	102	13.5604	400.0000	0.0029	±0.01	Pass
	120	13.5601	100.0000	0.0007	±0.01	Pass
	138	13.5604	400.0000	0.0029	±0.01	Pass

Temperature Variations

Model Number	DW RFID1201					
Mode	Mode 9					
Date of Test	10/25/2011			Test Site	TE02	
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (%)	Limit (±%)	Result (Pass/Fail)
-20	120	13.5603	300.0000	0.0022	±0.01	Pass
-10		13.5605	500.0000	0.0037	±0.01	Pass
0		13.5602	200.0000	0.0015	±0.01	Pass
10		13.5602	200.0000	0.0015	±0.01	Pass
20		13.5601	100.0000	0.0007	±0.01	Pass
30		13.5603	300.0000	0.0022	±0.01	Pass
40		13.5604	400.0000	0.0029	±0.01	Pass
50		13.5602	200.0000	0.0015	±0.01	Pass

Voltage Variations

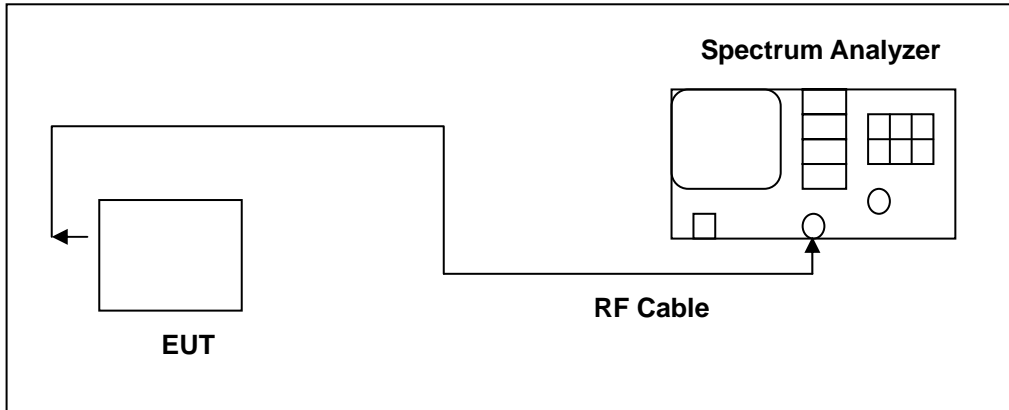
Model Number	DW RFID1201					
Mode	Mode 9					
Date of Test	10/25/2011			Test Site	TE02	
Temp. (°C)	Voltage (VAC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (%)	Limit (±%)	Result (Pass/Fail)
20	102	13.5604	400.0000	0.0029	±0.01	Pass
	120	13.5601	100.0000	0.0007	±0.01	Pass
	138	13.5604	400.0000	0.0029	±0.01	Pass

7 99% Occupied Bandwidth Measurement

7.1. Limit

N/A

7.2. Test Setup



7.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/16/2011	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: ⁽¹⁾ Calibration period 1 year. ⁽²⁾ Calibration period 2 years.

NOTE: N.C.R. = No Calibration Request.

7.4. Test Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage. The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer used the following settings:

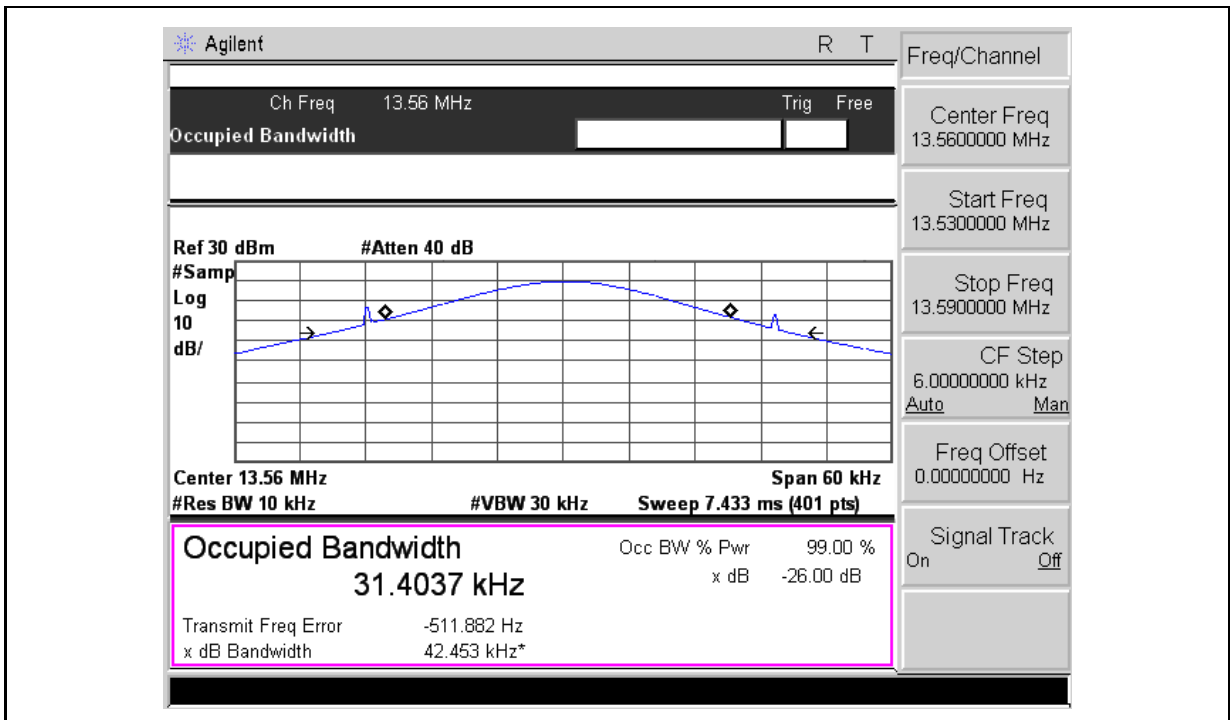
1. Span = 30 kHz
2. RBW \geq 1% of the 20dB span
3. VBW \geq RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold

The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate. The marker-to-peak function was used to set the marker to the peak of the emission. The marker-delta function was used to measure 20dB down one side of the emission. The marker-delta function and marker was moved to the other side of the emission until it was even with the reference marker. The marker-delta reading at this point was the 20dB bandwidth of the emission.

7.5. Test Result

Model Number	DW RFID1201		
Mode	Mode 4		
Date of Test	10/25/2011	Test Site	TE02
Frequency (MHz)	Measurement (kHz)		
13.5600	31.4037		

Model Number	DW RFID1201		
Mode	Mode 9		
Date of Test	10/25/2011	Test Site	TE02
Frequency (MHz)	Measurement (kHz)		
13.5600	30.5371		

7.6. Test Graphs
Mode 4:


Mode 9:

