

# Certificate of Test

January 2011

## WAVE TEK TECHNOLOGY Co., Ltd.

Product Type : RFID HF Reader  
Model Number : WM150  
Brand Name : WAVE-TEK  
Test Report Number : 1012009R-01  
Date of Test : December 13, 2010 – December 16, 2010

This Product was tested to the following standards at the laboratory of Global EMC Standard Tech. Corp., and found Compliance.

Standards:  
FCC Part 15 Subpart C Paragraph 15.225  
ANSI C63.4: 2009

[http : //www.gestek.com.tw](http://www.gestek.com.tw)



Sharon Chang, President

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Issue Date: January 05, 2011



NVLAP LAB CODE 200065-0





**Test Report  
Application for  
Certification  
On Behalf Of**

**WAVE TEK TECHNOLOGY Co., Ltd.**

**EUT: RFID HF Reader**

**Model Number: WM150**

**FCC ID: Y4V-WM150**

**Prepared for:  
WAVE TEK TECHNOLOGY Co., Ltd.  
12F., No.953, Jhongjheng Rd., Jhonghe City., Taipei County 235,  
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## 1. CERTIFICATION

**Applicant** : **WAVE TEK TECHNOLOGY Co., Ltd.**

EUT Description : RFID HF Reader

Model Number : WM150

Serial Number : N/A

Brand Name : WAVE-TEK

FCC ID : Y4V-WM150

Tested Power Supply : DC 5V By USB

Manufacturer : WAVE TEK TECHNOLOGY Co., Ltd.

Manufacturer Address : 12F., No.953, Jhongjheng Rd., Jhonghe City., Taipei County 235, Taiwan (R.O.C.)

### MEASUREMENT PROCEDURES USED:

- ☒ **CFR 47, Part 15** Radio Frequency Device Subpart C Intentional Radiators :2008
- ☒ **ANSI C63.4** Methods of Measurements of Radio-Noise Emissions from Low- Voltage Electrical and Electronic Equipment in the range of 9kHz To 40GHz. 2009

THE MEASUREMENT SHOWN IN THE ATTACHMENT WAS MADE IN ACCORDANCE WITH THE PROCEDURES INDICATED, AND THE MAXIMUM ENERGY EMITTED BY THE EQUIPMENT WAS FOUND TO BE WITHIN THE ABOVE LIMITS APPLICABLE.



NVLAP LAB CODE 200085-0

Sample Received Date: **December 06, 2010**  
Date of Test : **December 13, 2010** – **December 16, 2010**  
Issue Date : **January 05, 2011**

In order to ensure the quality and accuracy of this document, the contents have been thoroughly reviewed by the following qualified personnel from GesTek Lab.

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Tony Tsai / Director

This test data shown below is traceable to National or international standard such as NIST/USA, etc. The laboratory's NVLAP accreditation in no way constitutes or implies product certification, approval, or endorsement by NVLAP or the United States government.

## 2. GENERAL INFORMATION

### 2.1 PRODUCTION DESCRIPTION

<b>Product Name</b>	: RFID HF Reader
<b>Model Number</b>	: WM150
<b>Serial Number</b>	: N/A
<b>Brand Name</b>	: WAVE-TEK
<b>FCC ID</b>	: Y4V-WM150
<b>Modulation Type</b>	: ASK
<b>Antenna Gain</b>	: 5 dBi
<b>Antenna Type</b>	: Printed On PCB
<b>Frequencg Range</b>	: 13.56 MHz
<b>Channel Number</b>	: 1 Channel
<b>Working Voltage</b>	: DC 5V By USB

**Note:**

1. This device is transceiver of 13.56MHz RF Module. The test report is for transmit function.
2. Test of channel was 13.56MHz frequency in highest data rate and to perform the test, then record on this report.
3. The antenna of EUT is printer on PCB and conform to FCC 15.203.
4. These tests were radiated on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.225.
5. The associate of receiver to accordance with Part 15 regulations and under Declaration of Conformity and record of measurment in test report that the report number is 1012009F-01.
6. UART Interface:

Main functions: For update the firewall of the products, it is the same with USB Interface circuit, use DC 5V, is an alternative to using the interface.

Secondary function: It can provide power through the USB to UART cable.

This module is mainly provided by the USB interface for power.

## 2.2 OPERATIONAL DESCRIPTION

This device is transceiver of 13.56MHz RF Module included transmit and receive function.  
Another information please refer to users manual.

## 2.3 TEST MODES & EUT COMPONENTS DESCRIPTION

EUT: RFID HF Reader, M/N: WM150	
Test Mode	Mode 1-Transmit

## 2.4 SUMMARY OF TEST PROCEDURE AND TEST RESULTS

Test Item	Applied Standard Section	Test Result
Conducted Emission	15.207, ANSI C63.4 Section 7	Pass (refer to section 3.7)
Radiated Emission	15.209, ANSI C63.4 Section 8	Pass (refer to section 4.7)
The field strength of fundamental	15.225(a), ANSI C63.4 Section 13	Pass (refer to section 5.6)
The field strength of any emissions appearing outside	15.225(d) , ANSI C63.4 Section 13	Pass (refer to section 6.6)
Frequency Stability	15.225(e) , ANSI C63.4 Section 13	Pass (refer to section 7.6)

## 2.5 CONFIGURATION OF THE TESTED SYSTEM

The FCC IDs/Types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

Item	Device	No.	Configuration
1	NOTEBOOK	DELL NB 1	Model Number : Latitude D600 PPO5L BSMI ID : R33002 FCC ID : E2K24CLNS Serial Number : 10826163280 C.P.U : Intel Pentium M 1.4G HZ DDR : PC2100 256MB WIRELESS LAN CARD : Manufacturer :INTEL M/N:WM3A2100 FCC ID: E2K24CLNS F.D.D : N/A H.D.D. : Manufacturer : FUJITSU 30G M/N: MHT2030AT S/N:NN15T421E09C BSMI ID:D33073 DVD-ROM : Manufacturer :DELL M/N:5W299-A01 BATTERY MODULE : Manufacturer :DELL Li-ion M/N:6Y270 RATING:14.8V 220mAh AC ADAPTOR : Manufacturer :DELL M/N: PA-1650-05D S/N:CN-05U092-48010-39N-227C INPUT:AC 100-240 V~1.5A 50-60HZ Shielded, Undetachable, 2.5m

## 2.6 LAB AMBIENT

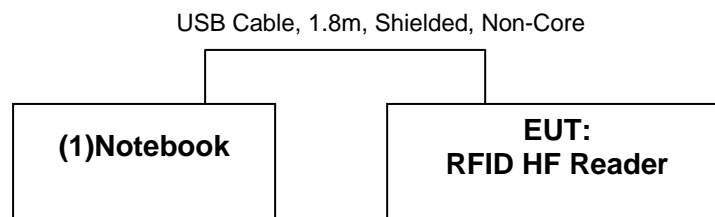
Items	Range Requirement
Temperature (°C)	10-40
Humidity (%RH)	10-90
Barometric pressure (mbar)	860-1060

## 2.7 TEST FACILITY ACCREDITATION

Global EMC Standard Tech. Corp. is accredited in respect of laboratory and the accreditation criteria is ISO/IEC 17025: 2005.

ACCREDITATION	
<b>FCC SITE DESCRIPTION</b>	Aug. 10, 1995 /Aug. 25, 1998 File on FCC Engineering Laboratory Federal Communication Commission 7435 Oakland Mills Road Columbia, MD 21046 Reference 31040/SIT1300F2
<b>NVLAP LAB. CODE</b>	200085-0 United States Department of commerce National Institute of Standards and Technology National Voluntary Laboratory Accreditation Program Accreditation on NVLAP effective through Sep. 30, 2011 For CISPR 22, FCC Method and AS/NZS CISPR 22 Measurement.
<b>Taiwan Accreditation Foundation (TAF)</b>	Recognized by the Council of Taiwan Accreditation Foundation and confirmed to meet the requirements of ISO/IEC 17025. Registration No.: 1082 Registration on TAF effective through Sep. 19, 2012

## 2.8 TEST SETUP



## 2.9 EUT OPERATING CONDITIONS

The EUT exercise program used during conducted testing was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

1. Setup the EUT and simulators as shown on 2.8.
2. Turn on the power of all equipments.
3. The transceiver will transmit the signal continue.
4. Repeat the above steps.



### 3. CONDUCTED EMISSION MEASUREMENT

#### 3.1 TEST EQUIPMENTS

Item	Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
1	Test Receiver	R & S	ESCS30	100393	2011.03.22
2	L.I.S.N.(EUT)	R & S	ENV216	100108	2011.05.23
3	L.I.S.N.(AE)	ROLF HEINE	NNB-4/32T	99007	2011.12.07
4	RF CABLE	GTK	N/A	GTK-E-A154-01	2011.01.14
5	50 Ohm Terminator	GTK	N/A	GTK-E-A130-01	N/A

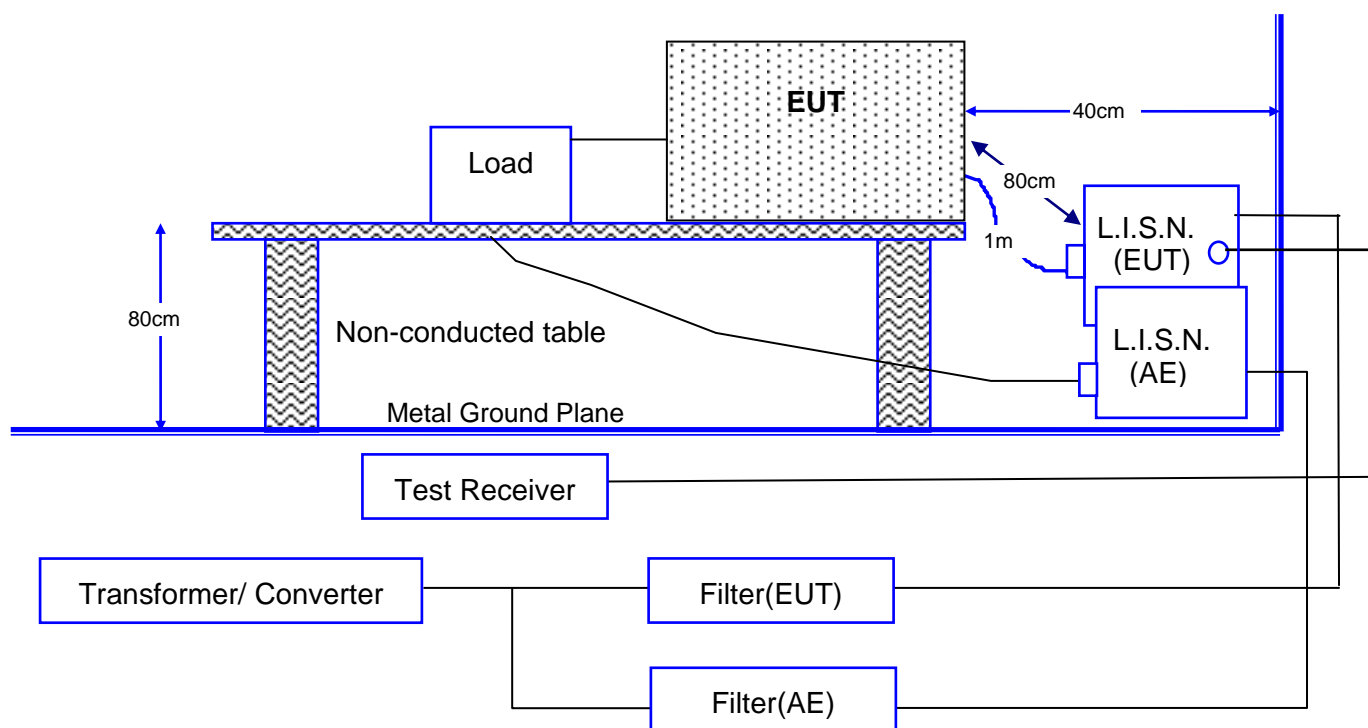
Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B5.

#### 3.2 TEST METHOD

According to ANSI C63.4: 2009

#### 3.3 BLOCK DIAGRAM OF TEST SETUP



Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all others setup condition remain the same.

### 3.4 CONDUCTED EMISSION LIMITS

Frequency	Maximum RF Line Voltage dB( $\mu$ V)	
MHz	QUASI-PEAK	AVERAGE
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.0	56	46
5.0 to 30	60	50

Remarks : In the Above Table, the tighter limit applies at the band edges.

### 3.5 EUT CONFIGURATION ON MEASUREMENT

The equipments that are listed in section 3.1 are installed on Conducted Power Line Test in order to meet the requirement of the Commission and operating in a manner, which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 3.3, was placed on a non-conductive table whose total height equal to 80cm. Powered from one L.I.S.N. which signal output to receiver, and the other peripherals was powered from another L.I.S.N. which signal output was terminated by 50 $\Omega$ .

### 3.6 CONDUCTED EMISSION MEASURED PROCEDURE AND DATA

The measurement range of conducted emission, which is from 0.15 MHz to 30 MHz, was scan for peak emission curve of all the test modes. The worst mode is then measured using an average and/or quasi peak detector and record at least the disturbance levels and the frequencies of the six highest disturbances. The final measurement value is equal to the receiver reading plus the correction factor. If AMN insertion loss is more than 0.5dB, automatically the receiver will add the correction factor to the reading level.

### 3.7 CONDUCTED EMISSION MEASUREMENT RESULTS

Date of Test	December 13, 2010	Temperature	26 °C
EUT	RFID HF Reader	Humidity	60 %
Test Mode	Mode 1	Display Pattern	Progarm
Test Power Supply	AC 120V/60Hz		

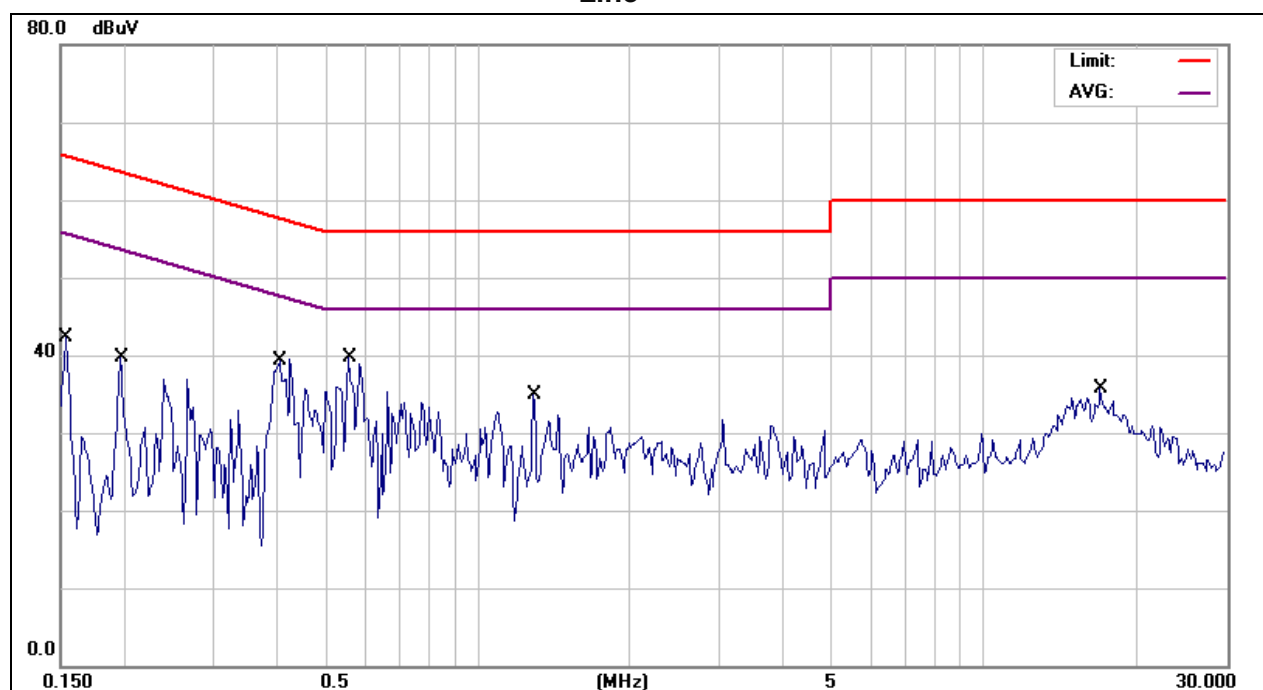
#### Line

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1531	27.03	9.60	36.63	65.83	-29.20	QP
2	0.1531	9.75	9.60	19.35	55.83	-36.48	AVG
3	0.1967	24.31	9.60	33.91	63.75	-29.84	QP
4	0.1967	9.05	9.60	18.65	53.75	-35.10	AVG
5	0.4071	26.37	9.59	35.96	57.71	-21.75	QP
6	0.4071	16.66	9.59	26.25	47.71	-21.46	AVG
7	★0.5553	25.90	9.59	35.49	56.00	-20.51	QP
8	0.5553	12.42	9.59	22.01	46.00	-23.99	AVG
9	1.2909	17.79	9.62	27.41	56.00	-28.59	QP
10	1.2909	6.41	9.62	16.03	46.00	-29.97	AVG
11	17.1608	18.50	9.69	28.19	60.00	-31.81	QP
12	17.1608	11.58	9.69	21.27	50.00	-28.73	AVG

#### Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have  $\pm 0.01$  tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. " ★ " means that this data is the worse case measurement level.
6. The measurement uncertainty is 3.7 dB.

#### Line



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
  2. The AVG (The purple line of the graph indicates the average measurements).
  3. The scan curve indicates peak detector measurement.

Date of Test	December 13, 2010	Temperature	26 °C
EUT	RFID HF Reader	Humidity	60 %
Test Mode	Mode 1	Display Pattern	Progarm
Test Power Supply	AC 120V/60Hz		

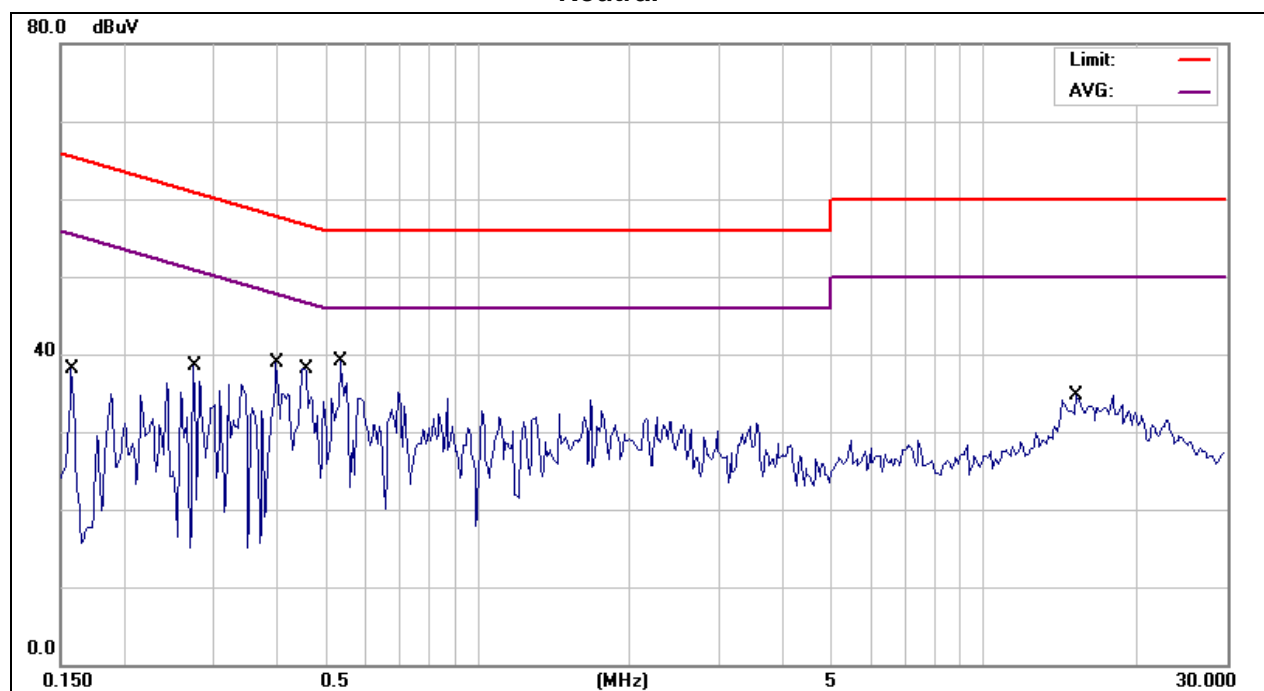
## Neutral

No.	Frequency MHz	Reading Level dBμV	Factor dB	Measurement dBμV	Limit dBμV	Over Limit dB	Detector
1	0.1574	27.19	9.60	36.79	65.60	-28.81	QP
2	0.1574	8.41	9.60	18.01	55.60	-37.59	AVG
3	0.2750	26.23	9.60	35.83	60.97	-25.14	QP
4	0.2750	13.04	9.60	22.64	50.97	-28.33	AVG
5	★0.3997	26.01	9.59	35.60	57.86	-22.26	QP
6	0.3997	15.13	9.59	24.72	47.86	-23.14	AVG
7	0.4526	24.71	9.59	34.30	56.83	-22.53	QP
8	0.4526	10.29	9.59	19.88	46.83	-26.95	AVG
9	0.5372	23.59	9.59	33.18	56.00	-22.82	QP
10	0.5372	10.48	9.59	20.07	46.00	-25.93	AVG
11	15.3310	18.86	9.79	28.65	60.00	-31.35	QP
12	15.3310	11.82	9.79	21.61	50.00	-28.39	AVG

## Remarks :

1. All readings are Quasi-peak and Average values.
2. Measurement = Reading + Factor (Could have  $\pm 0.01$  tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = L.I.S.N. insertion loss + cable loss
5. "★" means that this data is the worse case measurement level.
6. The measurement uncertainty is 3.7 dB.

## Neutral



- Remark:
1. The Limit (The red line of the graph indicates the quasi-peak measurements).
  2. The AVG (The purple line of the graph indicates the average measurements).
  3. The scan curve indicates peak detector measurement.

## 4. RADIATION EMISSION DATA

### 4.1 TEST EQUIPMENT

The following test equipments are used during the radiated emission tests:

Item	Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
1	RECEIVER	R & S	ESCS30	825022/003	2011.09.28
2	SPECTRUM	RS	FSL6	100517	2011.08.04
3	PRE-AMPLIFIER	EMV-Technik	PA303	GTK-E-A393-01	2011.07.05
4	Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-253	2011.03.03
5	CABLE	GTK	N/A	GTK-E-A344-01	2011.04.14

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.

2. The test was performed in GTK Chamber A6.

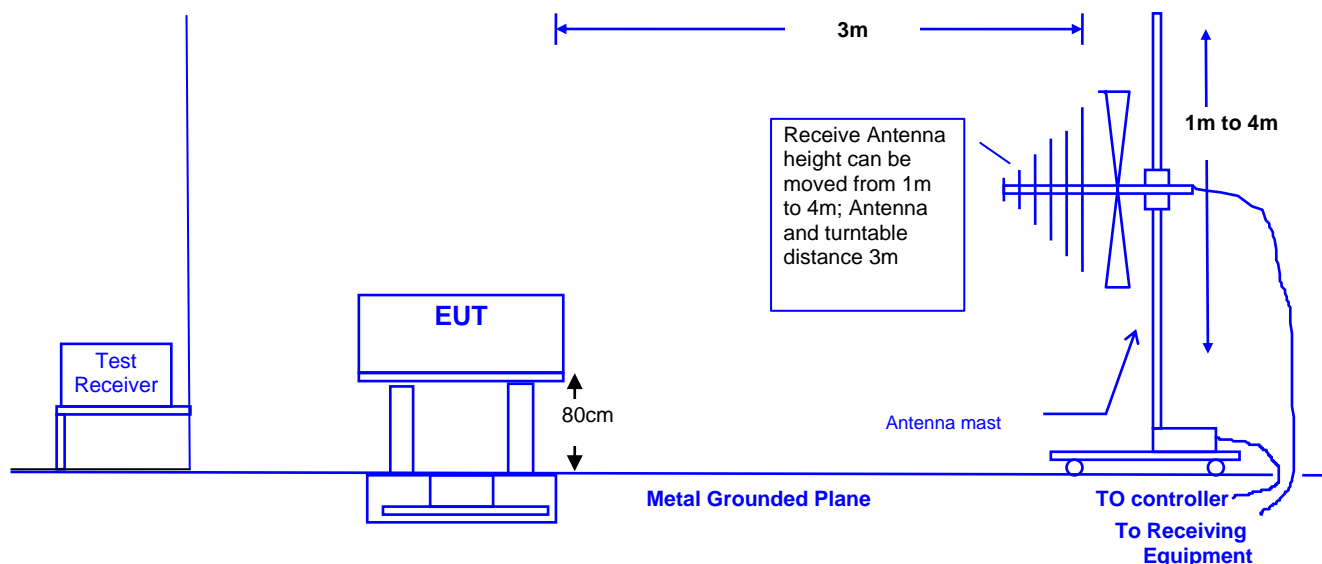
### 4.2 TEST METHOD

According to ANSI C63.4: 2009

### 4.3 TEST SITE SETUP DIAGRAM

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all the other setup conditions remain the same.



#### 4.4 RADIATED EMISSION LIMIT

##### ☒ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency	Distance	Field Strength	
MHz	Meter	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 to 88	3	100	40.0
88 to 216	3	150	43.5
216 to 960	3	200	46.0
Above 960	3	500	54.0

##### Remarks :

1. RF Voltage ( $\text{dB}\mu\text{V/m}$ ) =  $20 \log \text{RF Voltage } (\mu\text{V/m})$
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

#### 4.5 EUT CONFIGURATION

The equipment which is listed 4.1 are installed on Radiated Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 4.3, was placed on a non-conductive table whose total height equaled 80 cm. This table can be rotated 360 degree. The measurement antenna was mounted to a non-conductive mast capable of moving the antenna vertically. Antenna height was varied from 1 meter to 4 meters and the system under test was rotated from 0 degree through 360 degrees relative to the antenna position and polarization (Horizontal and Vertical). Also the I/O cable position was investigated to find the maximum emission condition.

#### 4.6 RADIATED EMISSION DATA

The measurement range of radiated emission, which is from **30 MHz to 10<sup>th</sup> harmonic of fundamental**, was investigated. All readings below 1GHz are quasi-peak values with a resolution bandwidth of 120 KHz. Above 1GHz are peak and avg. values with a resolution bandwidth of 1MHz. The initial step in collecting radiated emission data is a spectrum analyzer peak scans of the measurement range for all the test modes and then use test receiver for final measurement. Then the worst modes were reported the following data pages.

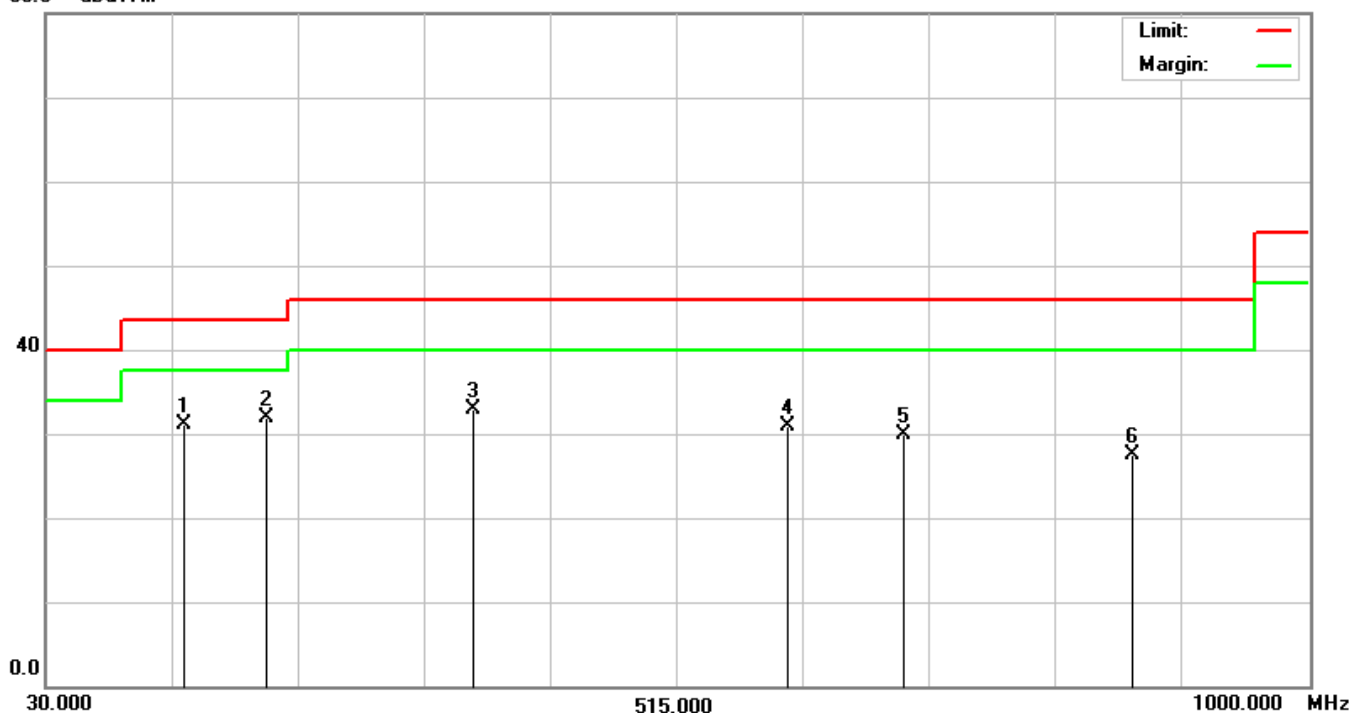
#### 4.7 RADIATED EMISSIONS MEASUREMENT RESULTS

Date of Test	December 13, 2010	Temperature	26 deg/C
EUT	RFID HF Reader	Humidity	60 %RH
Working Cond.	Mode 1	Display Pattern	Progarm
Antenna distance	3m at Horizontal	Test Frequency Range	30-1000MHz

No.	Frequency MHz	Reading Level dB $\mu$ V	Factor dB	Measurement dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Detector
1	137.2596	46.62	-15.57	31.05	43.50	-12.45	QP
2	★199.4391	48.90	-17.09	31.81	43.50	-11.69	QP
3	359.5513	44.59	-11.73	32.86	46.00	-13.14	QP
4	600.4968	36.61	-5.80	30.81	46.00	-15.19	QP
5	690.6571	34.66	-4.74	29.92	46.00	-16.08	QP
6	866.3141	29.32	-1.86	27.46	46.00	-18.54	QP

#### Remarks:

1. All Readings below 1GHz are Quasi-Peak.
2. Measurement = Reading + Factor (Could have  $\pm 0.01$  tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = antenna factor + cable loss – amplifier gain.
5. “★” means that this data is the worse case measurement level.
6. The emission level of other frequencies are very lower than the limit.

80.0 dB $\mu$ V/m

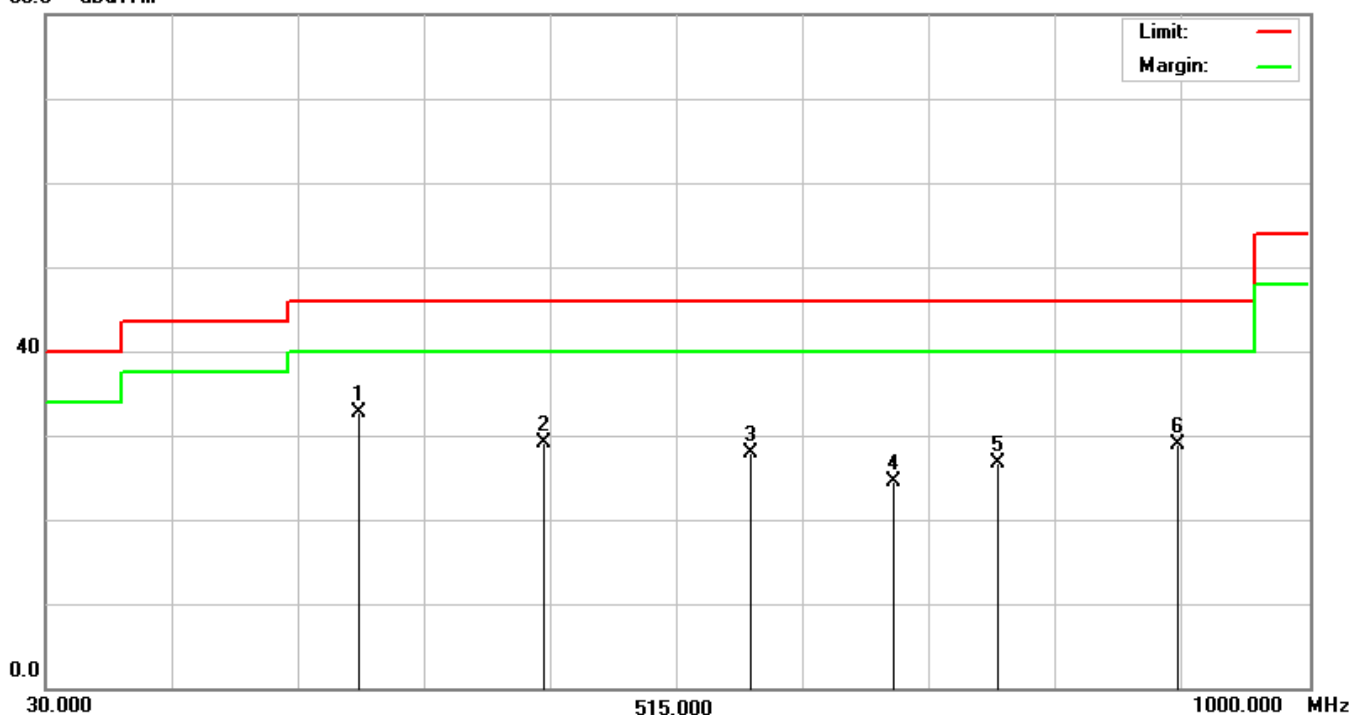
- Remark:
1. The Limit (The red line of the graph indicates the quasi -peak measurements).
  2. The Margin (The green line of the graph indicates the 6dB margin).

Date of Test	December 13, 2010	Temperature	26 deg/C
EUT	RFID HF Reader	Humidity	60 %RH
Working Cond.	Mode 1	Display Pattern	Program
Antenna distance	3m at Vertical	Test Frequency Range	30-1000MHz

No.	Frequency MHz	Reading Level dB $\mu$ V	Factor dB	Measurement dB $\mu$ V/m	Limit dB $\mu$ V/m	Over Limit dB	Detector
1	★270.9455	47.18	-14.47	32.71	46.00	-13.29	QP
2	413.9583	39.40	-10.29	29.11	46.00	-16.89	QP
3	572.5160	34.36	-6.47	27.89	46.00	-18.11	QP
4	682.8846	29.28	-4.83	24.45	46.00	-21.55	QP
5	762.1635	30.15	-3.46	26.69	46.00	-19.31	QP
6	900.5128	30.39	-1.41	28.98	46.00	-17.02	QP

**Remarks:**

1. All Readings below 1GHz are Quasi-Peak.
2. Measurement = Reading + Factor (Could have  $\pm 0.01$  tolerance due to computer automatically round off calculation).
3. Over Limit (Margin Value)=Measurement level-Limit value.
4. Factor = antenna factor + cable loss – amplifier gain.
5. “★” means that this data is the worse case measurement level.
6. The emission level of other frequencies are very lower than the limit.

80.0 dB $\mu$ V/m

- Remark:
1. The Limit (The red line of the graph indicates the quasi -peak measurements).
  2. The Margin (The green line of the graph indicates the 6dB margin).



## 5. RADIATION EMISSION DATA

### 5.1 TEST EQUIPMENT

The following test equipments are used during the radiated emission tests:

Item	Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
1	RECEIVER	R & S	ESCS30	825022/003	2011.09.28
2	SPECTRUM	RS	FSL6	100517	2011.08.04
3	Active Loop	EMCO	6507	95101353	2011.10.13
4	CABLE	GTK	N/A	GTK-E-A344-01	2011.04.14

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.

2. The test was performed in GTK Chamber A6.

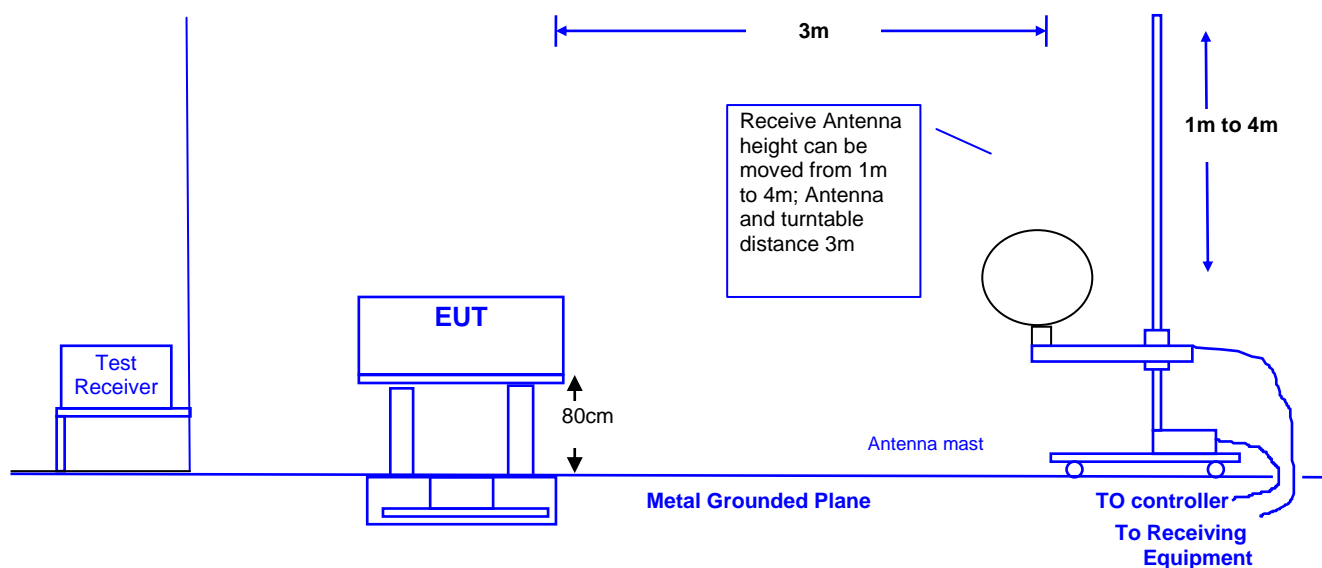
### 5.2 TEST METHOD

According to ANSI C63.4: 2009

### 5.3 TEST SITE SETUP DIAGRAM

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all the other setup conditions remain the same.



## 5.4 LIMITS

### ☒ Fundamental Limits

Frequency	Distance	Field Strength of Fundamental	Distance	Field Strength of Fundamental
MHz	Meter	$\mu\text{V/m}$	Meter	$\text{dB}\mu\text{V/m}$
13.553 ~ 13.567	30	15,848	3	124
13.410 ~ 13.553 and 13.567 ~ 13.710	30	334	3	90.5
13.110 ~ 13.410 and 13.710 ~ 14.010	30	106	3	80.5

#### Remarks :

1. RF Voltage ( $\text{dB}\mu\text{V/m}$ ) =  $20 \log$  RF Voltage ( $\mu\text{V/m}$ )
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

## 5.5 EUT CONFIGURATION

The equipment which is listed 5.1 are installed on Radiated Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 5.3, was placed on a non-conductive table whose total height equaled 80 cm. This table can be rotated 360 degree. The measurement antenna was mounted to a non-conductive mast capable of moving the antenna vertically. Antenna height was varied from 1 meter to 4 meters and the system under test was rotated from 0 degree through 360 degrees. Also the I/O cable position was investigated to find the maximum emission condition.

The combination of the worst emission are then used in Final test measurement, please refer to section 5.6 of the test report for the final test results.

## 5.6 TEST RESULTS

Date of Test	December 16, 2010	Temperature	26 deg/C
EUT	RFID HF Reader	Humidity	60 %RH
Working Cond.	Mode 1	Display Pattern	Progarm
Antenna distance	3m at LOOP ANT.		

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBuV/m	Limit dBuV/m	Over Limit dB	Detector
1	13.5600	46.90	17.70	64.60	144.00	-59.40	Peak
2	13.5600	45.20	17.70	62.90	124.00	-61.10	AVG

### Remark

1. Spectrum Analyzer Setting(Peak Detector): RBW=30kHz, VBW=30kHz, Span=100kHz.
2. Spectrum Analyzer Setting(Average Detector): RBW=30kHz, VBW=100HZ, Span=100kHz.
3. Measurement = Reading + Factor (Could have  $\pm 0.01$  tolerance due to computer automatically round off calculation).
4. Factor = antenna factor + cable loss – amplifier gain.
5. Over Limit (Margin Value)=Measurement level-Limit value.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the average value is measured, peak measurement should also be supplied.

## 6. The field strength of any emissions appearing outside

### 6.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
1	RECEIVER	R & S	ESCS30	825022/003	2011.09.28
2	SPECTRUM	RS	FSL6	100517	2011.08.04
3	Active Loop	EMCO	6507	95101353	2011.10.13
4	CABLE	GTK	N/A	GTK-E-A344-01	2011.04.14

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.

2. The test was performed in GTK Chamber A6.

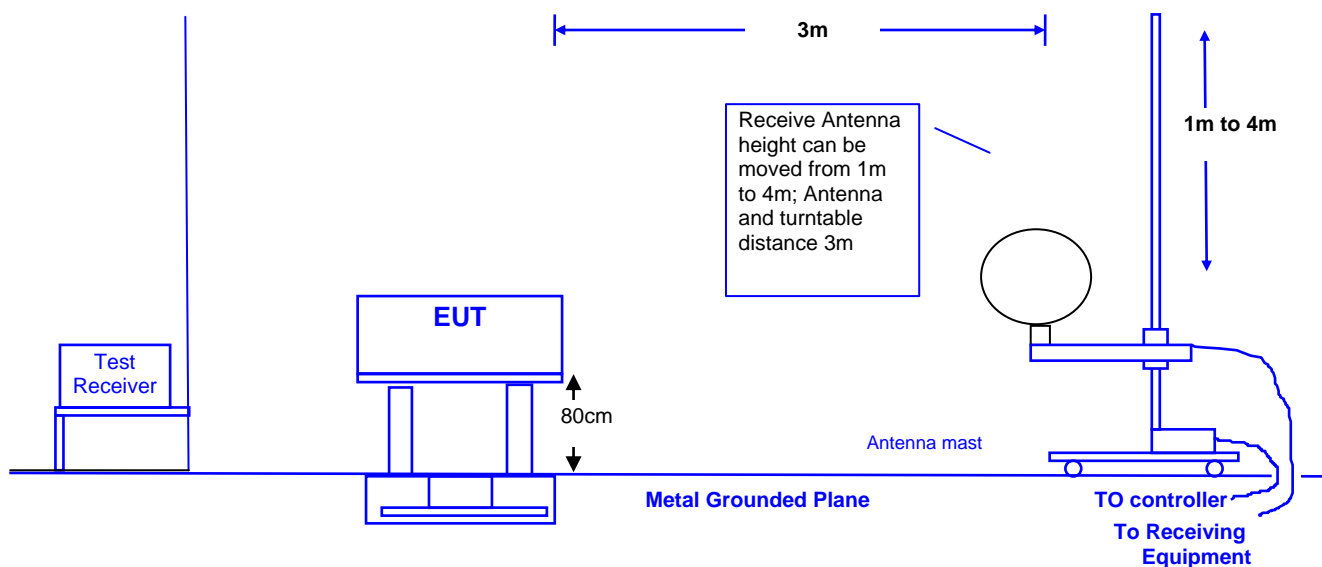
### 6.2 TEST METHOD

According to ANSI C63.4: 2009

### 6.3 TEST SITE SETUP DIAGRAM

Note: This is a representative setup diagram for Table-top EUT.

For Floor-standing EUT, the table will be removed with all the other setup conditions remain the same.



## 6.4 LIMITS

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Frequency	Field Strength (microvolts/meter)	Measurement Distance(meters)
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

## 6.5 EUT CONFIGURATION

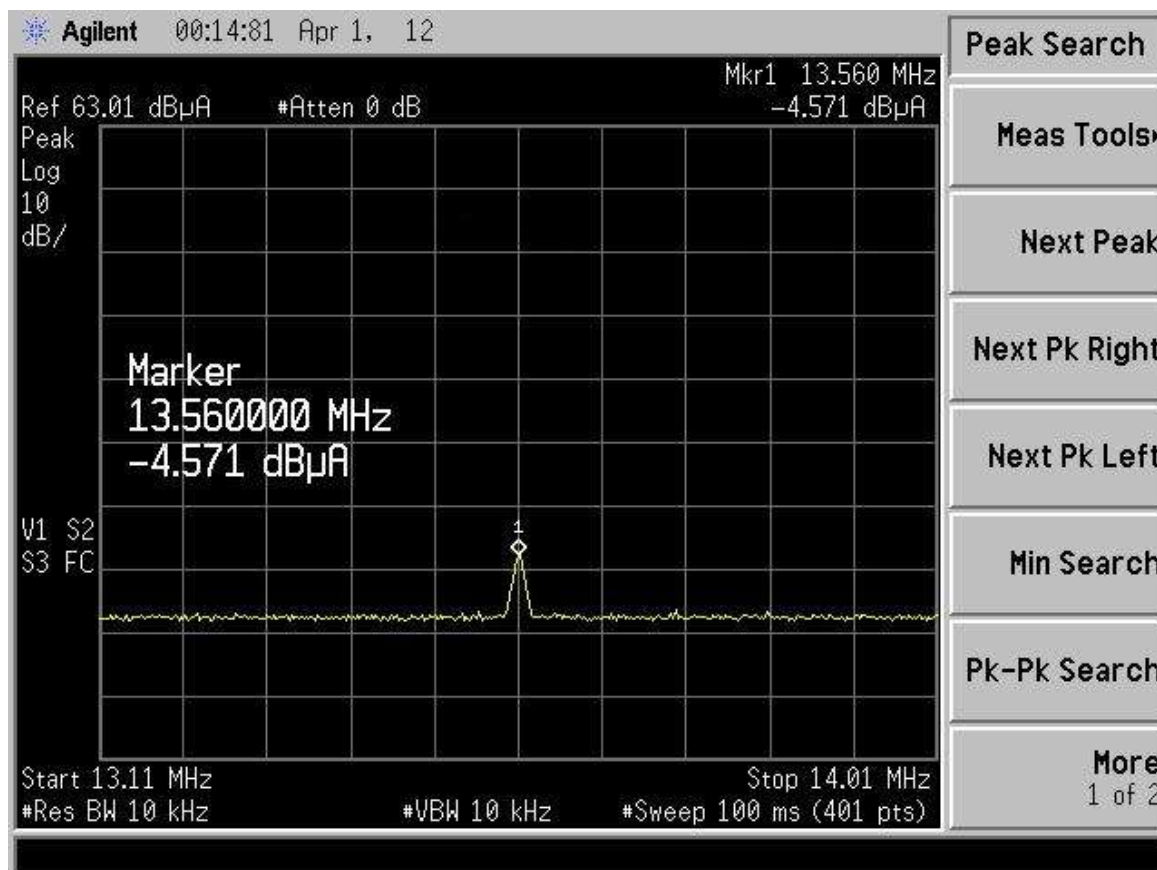
The equipment which is listed 6.1 are installed on Radiated Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

The device under test, installed in a representative system as described in section 6.3, was placed on a non-conductive table whose total height equaled 80 cm. This table can be rotated 360 degree. The measurement antenna was mounted to a non-conductive mast capable of moving the antenna vertically. Antenna height was varied from 1 meter to 4 meters and the system under test was rotated from 0 degree through 360 degrees. Also the I/O cable position was investigated to find the maximum emission condition.

The combination of the worst emission are then used in Final test measurement, please refer to section 6.6 of the test report for the final test results.

## 6.6 TEST RESULT

Date of Test	December 13, 2010	Temperature	26 deg/C
EUT	RFID HF Reader	Humidity	60 %RH
Working Cond.	Mode 1	Result	Pass



### Remark:

1. Spectrum Analyzer Setting(Peak Detector): RBW=10kHz, VBW=10kHz.

Date of Test	January 03, 2011	Temperature	26 deg/C
EUT	RFID HF Reader	Humidity	60 %RH
Working Cond.	Mode 1	Display Pattern	Progarm
Antenna distance	3m at LOOP ANT.		

No.	Frequency MHz	Reading Level dBuV	Factor dB	Measurement dBuV/m	Limit dBuV/m	Over Limit dB	Detector
1	0.1560	21.22	17.09	38.31	75.19	-36.88	QP
2	0.2270	16.37	16.95	33.32	68.18	-34.86	QP
3	0.5610	23.10	16.67	39.77	72.63	-32.86	QP
4	2.5170	22.38	16.65	39.03	69.50	-30.47	QP
5	7.9566	15.47	16.64	32.11	69.50	-37.39	QP
6	8.8563	19.15	16.62	35.77	69.50	-33.73	QP

**Remark**

1. Spectrum Analyzer Setting(Peak Detector): RBW=30kHz, VBW=30kHz, Span=100kHz.
2. Spectrum Analyzer Setting(Average Detector): RBW=30kHz, VBW=100HZ, Span=100kHz.
3. Measurement = Reading + Factor (Could have  $\pm 0.01$  tolerance due to computer automatically round off calculation).
4. Factor = antenna factor + cable loss – amplifier gain.
5. Over Limit (Margin Value)=Measurement level-Limit value.
6. The average measurement was not performed when the peak measured data under the limit of average detection. If the average value is measured, peak measurement should also be supplied.



- Remark:
1. The Limit (The red line of the graph indicates the quasi -peak measurements).
  2. The Margin (The green line of the graph indicates the 6dB margin).

## 7. FREQUENCY STABILITY

### 7.1 TEST EQUIPMENT

Item	Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
1	Spectrum Analyzer	HP	E4407B	US39240339	2011.08.29
2	Standard Temperature/ Humid. Chamber	WIT Scientific	TH-4S-B	W960909	2011.08.24

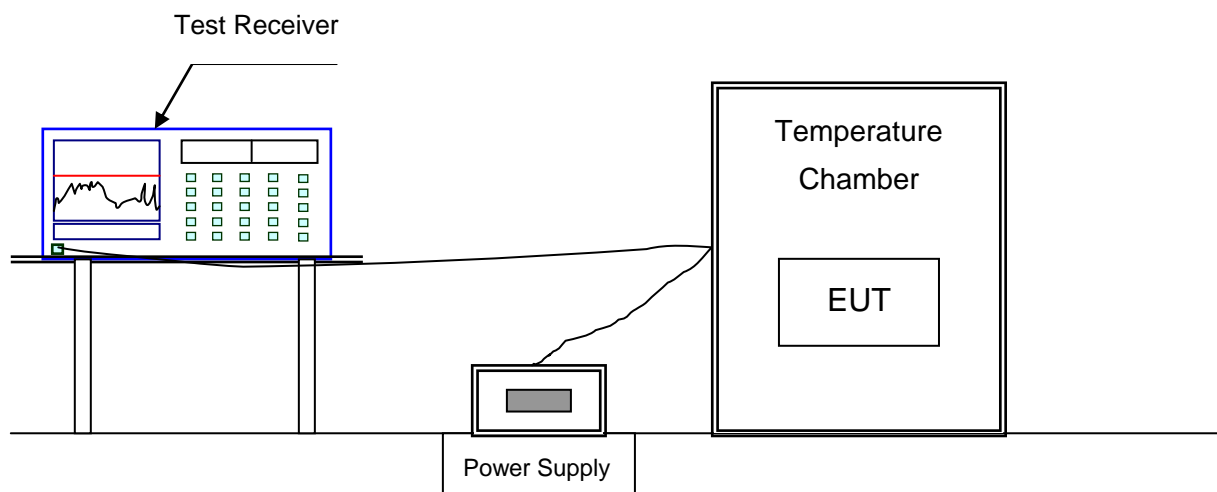
Note: 1. All equipments are calibrated and will be valid only for a period of 1 year.

2. The test was performed at GTK Shielded Room B8.

### 7.2 TEST METHOD

According to ANSI C63.4: 2009

### 7.3 TEST SITE SETUP DIAGRAM



### 7.4 TEST CONDITION

These measurements shall be performed at normal and extreme test conditions.

### 7.5 LIMITS

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  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.



## 7.6 FREQUENCY STABILITY TEST RESULT

Date of Test	December 13, 2010	Temperature	26 °C
EUT	RFID HF Reader	Humidity	60 %

Test Mode	Transmitter	Test Result	PASS
Test Conditions		Limit	Frequency (MHz)
Temperature	Voltage		
Normal ( 20 ) °C	High ( 138 )V	±0.01%	13.5600
Normal ( 20 ) °C	Low ( 102 )V		13.5590
High ( 50 ) °C	Normal ( 120 )V		13.5595
Low ( -20 ) °C	Normal ( 120 )V		13.5595

## 8. PHOTOGRAPHS FOR TEST

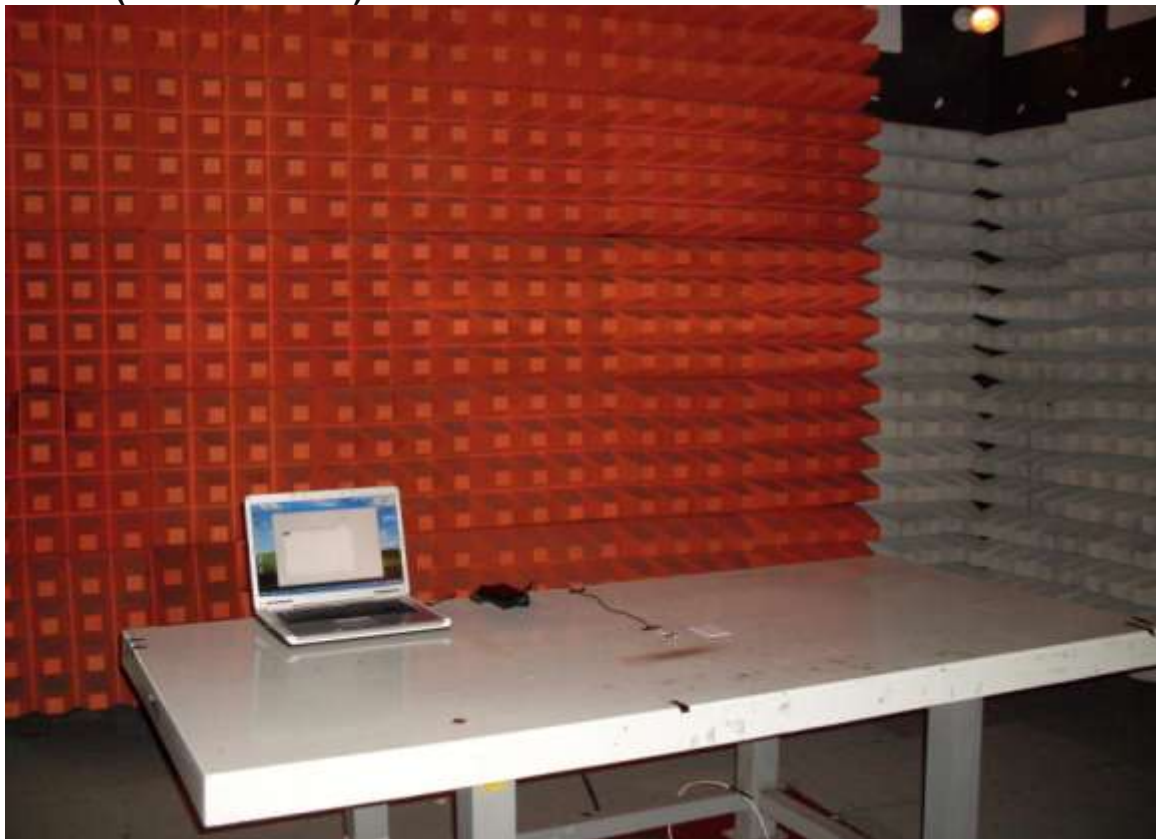
### 8.1 TEST PHOTOGRAPHS FOR CONDUCTION

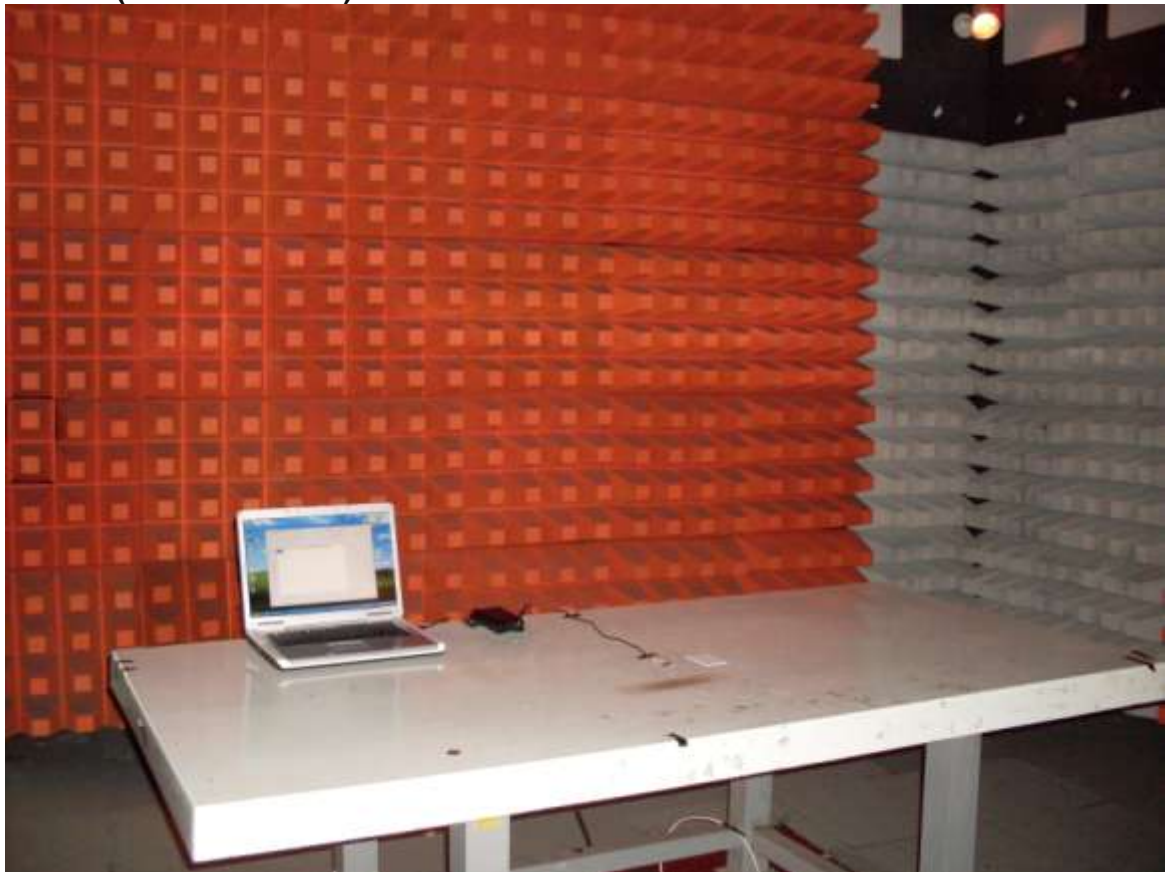
Mode 1



## 8.2 TEST PHOTOGRAPHS FOR RADIATION

Mode 1-(30 MHz to 1 GHz)



**Mode 1-(BELOW 30 MHz)**



## 9. PHOTOGRAPHS FOR PRODUCT

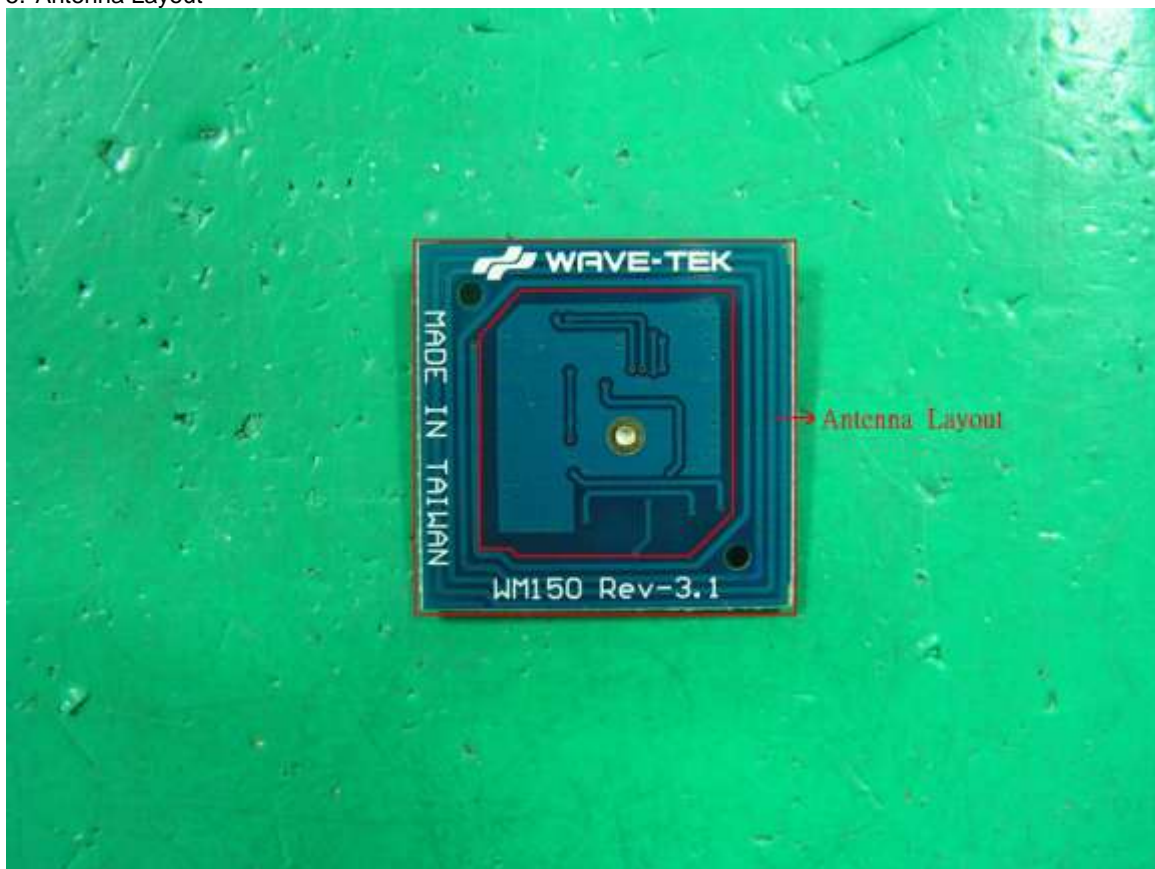
1. Front View of RFID HF Reader.(EUT)
2. Back View of RFID HF Reader.(EUT)



3. Front View of RFID HF Reader.(EUT)
4. Back View of RFID HF Reader.(EUT)



## 5. Antenna Layout



## 10. EMI REDUCTION METHOD DURING COMPLIANCE TESTING

No modification was made during testing.



## **Appendix A**

### **Circuit (Block) Diagram**

(Shall be added by Applicant)

## **Appendix B**

## **User Manual**

(Shall be added by Applicant)