

# FCC RADIO TEST REPORT

according to

47 CFR FCC Part 15 Subpart C § 15.225

**Equipment** : Point of Sales Terminal  
**Model No.** : VX680  
**Brand Name** : VeriFone  
**Filing Type** : Class II  
**Applicant** : VeriFone, Inc.  
1400 West Stanford Ranch Road Suit 200  
Rocklin CA 95765 USA  
**FCC ID** : B32VX680GPRSC TLS  
**Manufacturer** : Inventec Appliances (Pudong) Co.,Ltd.  
No.789 Pu Xing Road, Shanghai, PRC  
**Received Date** : Feb. 12, 2010  
**Final Test Date** : Dec. 23, 2010

## Statement

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart C**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.



## **SPORTON International Inc.**

No. 52 Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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# CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 15 Subpart C § 15.225

**Equipment** : Point of Sales Terminal

**Model No.** : VX680

**Brand Name** : VeriFone

**Applicant** : VeriFone, Inc.

1400 West Stanford Ranch Road Suit 200  
Rocklin CA 95765 USA

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Feb. 12, 2010 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Wayne Hsu / Vice Manager

## ***SPORTON International Inc.***

No. 52 Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

**1. SUMMARY OF THE TEST RESULT**

<b>Applied Standard: 47 CFR FCC Part 15 Subpart C</b>				
<b>Part</b>	<b>Rule Section</b>	<b>Description of Test</b>	<b>Result</b>	<b>Under Limit</b>
3.1	15.207	AC Power Line Conducted Emissions	Complies	11.84 dB
3.2	15.225(a)	Field Strength of Fundamental Emissions	Complies	43.97 dB
3.3	15.215(c)	20dB Spectrum Bandwidth	Complies	-
3.4	15.225(d)	Radiated Emissions	Complies	15.94 dB
3.5	15.225(e)	Frequency Stability	Complies	-
3.6	15.203	Antenna Requirements	Complies	-

<b>Test Items</b>	<b>Uncertainty</b>	<b>Remark</b>
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Field Strength of Fundamental Emissions	±0.8dB	Confidence levels of 95%
20dB Spectrum Bandwidth / Frequency Stability	±8.5×10 <sup>-8</sup>	Confidence levels of 95%
Radiated / Band Edge Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

## 2. GENERAL INFORMATION

### 2.1 Product Details

Items	Description
Power Type	12Vdc from AC Adapter ; 7.2Vdc from Li-ion Battery
Modulation	ASK
Channel Number	1
Channel Band Width (99%)	2.26 kHz
Max. Field Strength	59.03 dBuV/m at 10m (QP)
Test Freq. Range	13.553 ~ 13.567MHz
Carrier Frequencies	13.56 MHz (Ch. 1)
Antenna	Integrate Antenna (Without any antenna connector)

### 2.2 Accessories

Accessories Information					
Accessories or 2nd Source or Key Part	AC Adapter 1	Brand Name	VeriFone	Model Name	Au-79A0n
		Power Rating	I/P: 100-240Vac, 600mA, O/P:12Vdc, 2A		
	Battery 1 (Palladium Energy)	Brand Name	VeriFone	Model Name	24016-01-R
		Power Rating	7.2 Vdc, 1800mAh	Type	Li-ion
	Battery 2 (SANYO)	Brand Name	VeriFone	Model Name	24016-01-R
		Power Rating	7.2 Vdc, 1800mAh	Type	Li-ion
	2G Module	Brand Name	Cinterion	Model Name	mc55i
	RFID Module	Brand Name	NXP	Model Name	PN512

### 2.3 Table for Test Modes

Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Channel	Antenna
AC Power Line Conducted Emissions	Normal Mode	-	-
Field Strength of Fundamental Emissions	CTX	1	1
20dB Spectrum Bandwidth	CTX	1	NA
Radiated Emissions 9kHz~30MHz Radiated Emissions 9kHz~10 <sup>th</sup> Harmonic	CTX	1	1
Band Edge Emissions	CTX	1	1
Frequency Stability	Un-modulation	1	NA

Note: CTX=continuously transmitting.

### 2.4 Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.
CO01-HY	Conduction	Hwa Ya	643075	IC 4086B-1
TH01-HY	OVEN Room	Hwa Ya	-	-
10CH02-HY	SAC	Hwa Ya	643075	IC 4086B-1
03CH02-HY	SAC	Hwa Ya	643075	IC 4086B-1

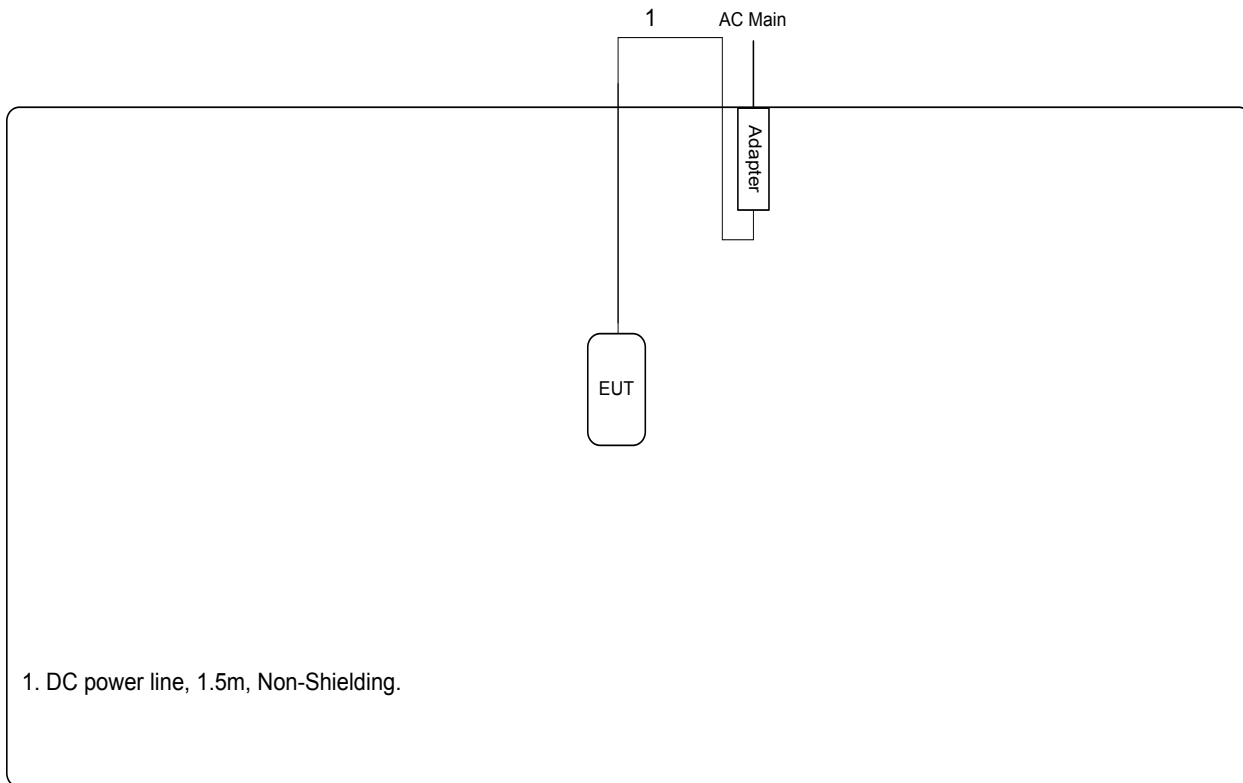
Semi Anechoic Chamber (SAC).

### 2.5 Table for Supporting Units

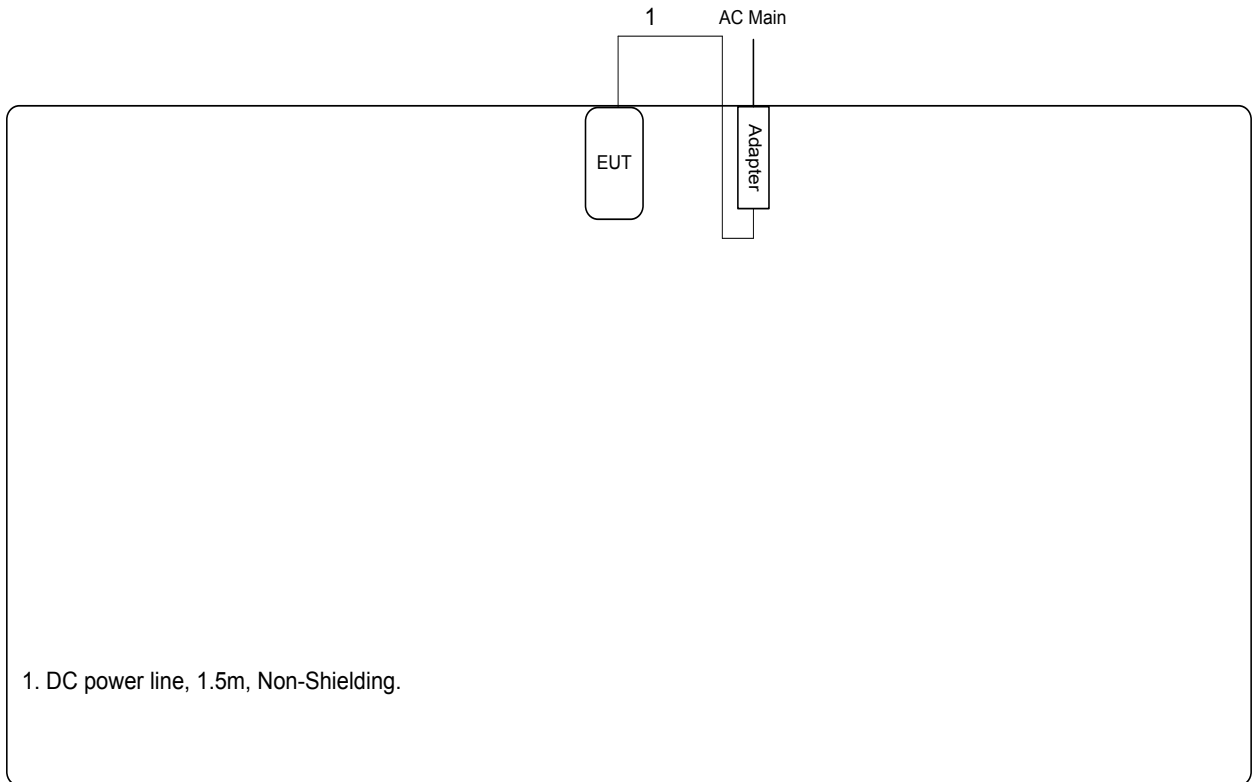
The EUT was tested alone.

## 2.6 Test Configurations

### Radiation Emissions Test Configuration For radiated emissions 9kHz~30MHz



**For radiated emissions 30MHz~1GHz**





### 3. TEST RESULT

#### 3.1 AC Power Line Conducted Emissions Measurement

##### 3.1.1 Limit

For a Low-power Radio-frequency device which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

##### 3.1.2 Measuring Instruments and Setting

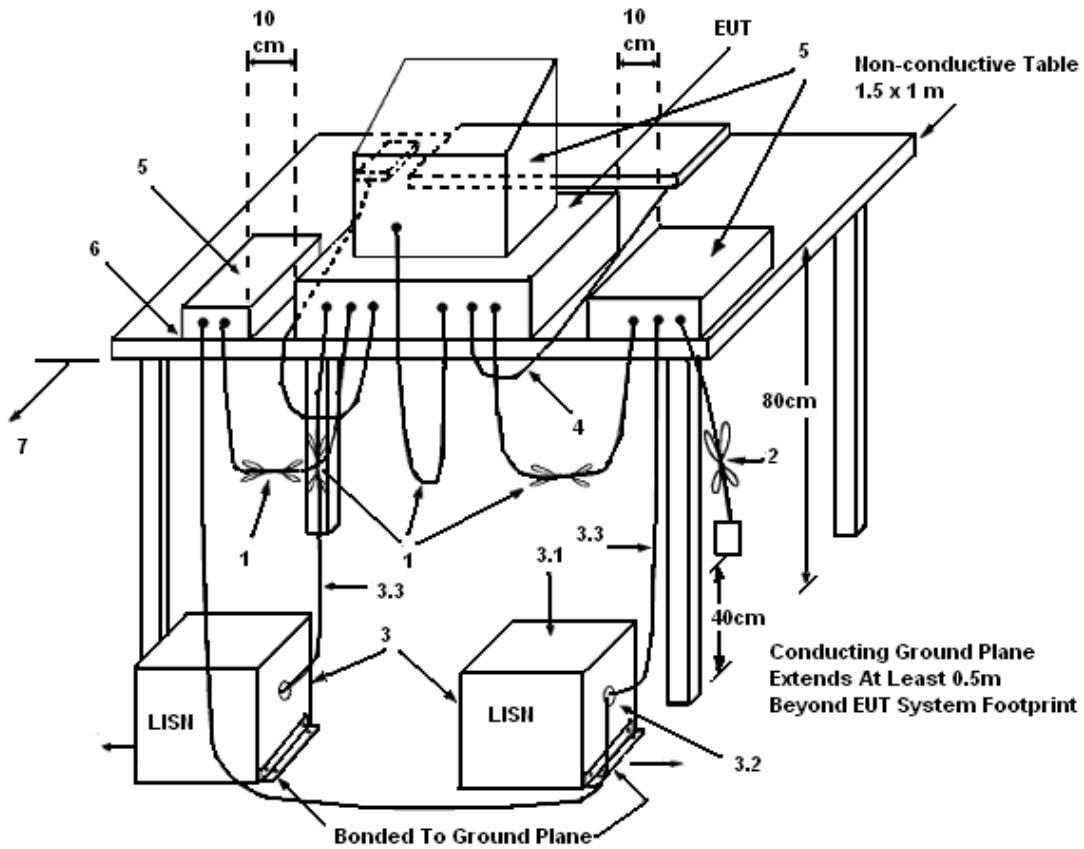
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

##### 3.1.3 Test Procedures

1. The EUT warm up about 15 minutes then start test.
2. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
7. The measurement has to be done between each power line and ground at the power terminal.

3.1.4 Test Setup Layout



LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.
- (3.1) All other equipment powered from additional LISN(s).
- (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
- (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

3.1.5 Test Deviation

There is no deviation with the original standard.

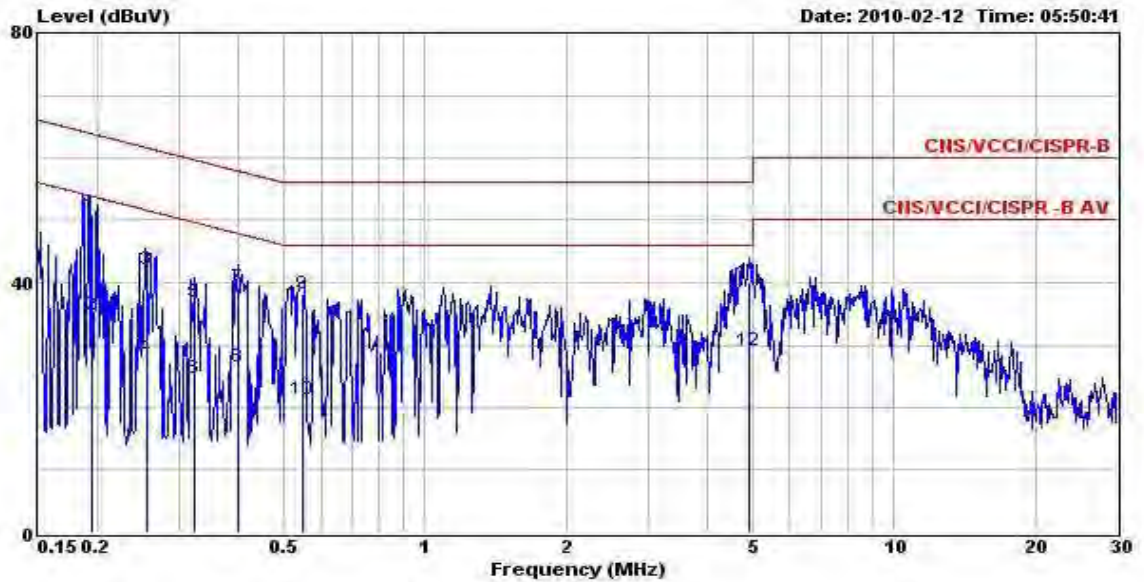
3.1.6 EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

3.1.7 Results of AC Power Line Conducted Emissions Measurement

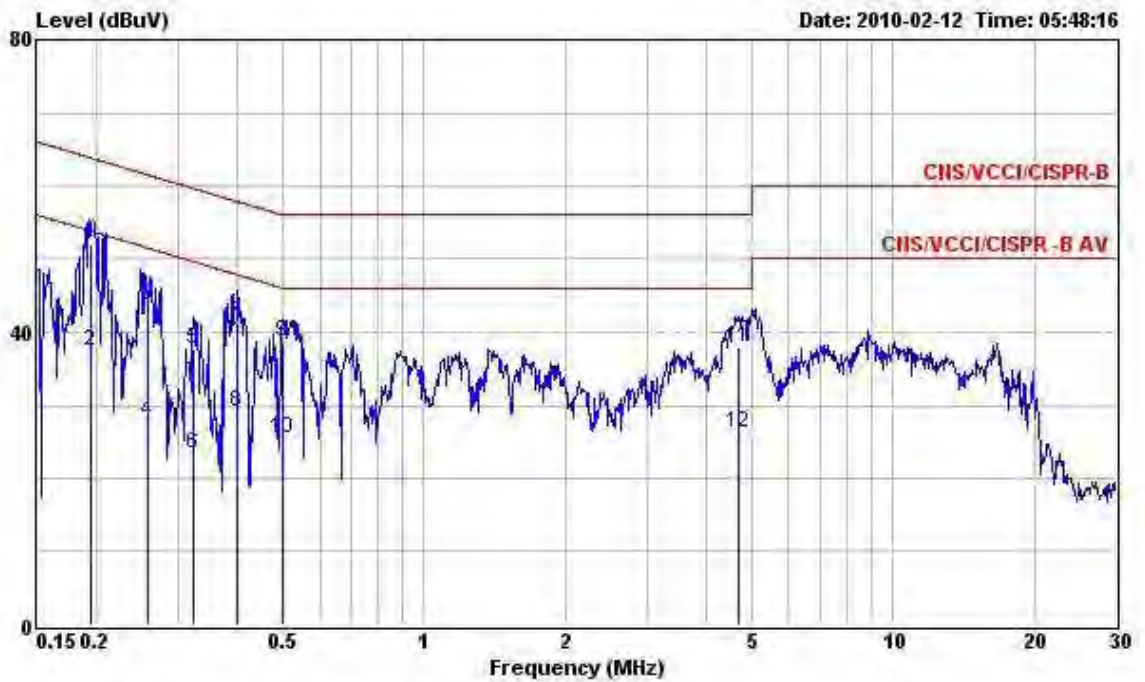
<b>Final Test Date</b>	Feb. 12, 2010	<b>Test Site No.</b>	CO01-HY
<b>Temperature</b>	23°C	<b>Humidity</b>	55%
<b>Test Engineer</b>	Steven	<b>Configuration</b>	Normal Mode

Line



	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.195	51.02	-12.79	63.81	50.88	0.08	0.06	QP
2	0.195	34.70	-19.11	53.81	34.56	0.08	0.06	Average
3	0.256	42.03	-19.54	61.57	41.89	0.08	0.06	QP
4	0.256	27.95	-23.62	51.57	27.81	0.08	0.06	Average
5	0.323	36.89	-22.74	59.63	36.73	0.09	0.07	QP
6	0.323	24.72	-24.91	49.63	24.56	0.09	0.07	Average
7	0.400	39.12	-18.73	57.85	38.96	0.09	0.07	QP
8	0.400	26.58	-21.27	47.85	26.42	0.09	0.07	Average
9	0.551	38.06	-17.94	56.00	37.87	0.10	0.09	QP
10	0.551	21.36	-24.64	46.00	21.17	0.10	0.09	Average
11	4.900	39.99	-16.01	56.00	39.63	0.19	0.17	QP
12	4.900	29.08	-16.92	46.00	28.72	0.19	0.17	Average

Neutral



	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.194	52.00	-11.84	63.84	51.88	0.06	0.06	QP
2	0.194	37.51	-16.33	53.84	37.39	0.06	0.06	Average
3	0.257	43.66	-17.87	61.53	43.54	0.06	0.06	QP
4	0.257	27.70	-23.83	51.53	27.58	0.06	0.06	Average
5	0.323	37.74	-21.89	59.63	37.60	0.07	0.07	QP
6	0.323	23.47	-26.16	49.63	23.33	0.07	0.07	Average
7	0.400	41.39	-16.46	57.85	41.25	0.07	0.07	QP
8	0.400	29.15	-18.70	47.85	29.01	0.07	0.07	Average
9	0.502	38.76	-17.24	56.00	38.60	0.07	0.09	QP
10	0.502	25.43	-20.57	46.00	25.27	0.07	0.09	Average
11	4.700	37.85	-18.15	56.00	37.53	0.16	0.16	QP
12	4.700	26.14	-19.86	46.00	25.82	0.16	0.16	Average

Note:  
Level = Read Level + LISN Factor + Cable Loss.

### 3.2 Field Strength of Fundamental Emissions and Mask Measurement

#### 3.2.1 Limit

Field strength of fundamental emissions limit:

The field strength of fundamental emissions shall not exceed 15848 micorvolts/meter at 30 meters. The emissions limit in this paragraph is based on measurement instrumentation employing a QP detector.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Field Strength (dBµV/m) at 10m	Field Strength (dBµV/m) at 3m
13.553 ~ 13.567MHz	15848 at 30m	103 (QP)	124 (QP)

Mask limit:

Rules and specifications		CFR 47 Part 15 section 15.225(a)-(d)			
Description	Compliance with the spectrum mask is tested using a spectrum analyzer with RB set to a 1kHz for the band 13.553~13.567MHz				
Limit	Freq. of Emission (MHz)	Field Strength (uV/m) at 30m	Field Strength (dBuV/m) at 30m	Field Strength (dBuV/m) at 10m	Field Strength (dBuV/m) at 3m
	1.705~13.110	30	29.5	48.58	69.5
	13.110~13.410	106	40.5	59.58	80.5
	13.410~13.553	334	50.5	69.58	90.5
	13.553~13.567	15848	84.0	103.08	124.0
	13.567~13.710	334	50.5	69.58	90.5
	13.710~14.010	106	40.5	59.58	80.5
14.010~30.000	30	29.5	48.58	69.5	

#### 3.2.2 Measuring Instruments and Setting

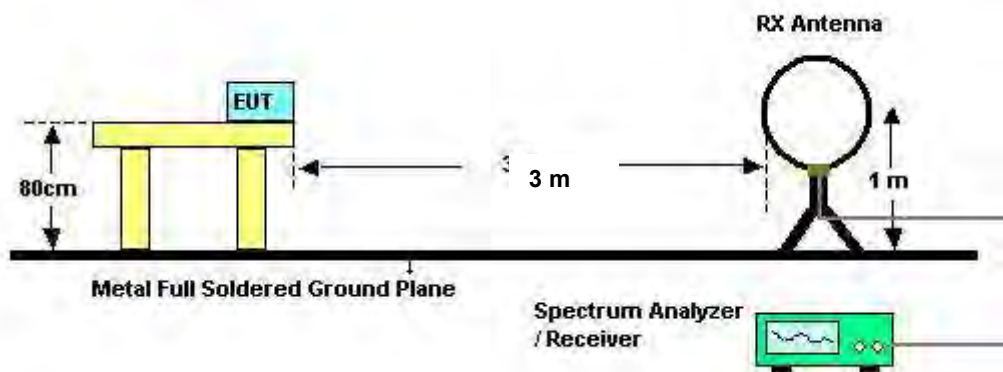
Please refer to section 4 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameter	Setting
Attenuation	Auto
Center Frequency	Fundamental Frequency
RB	9 kHz
Detector	QP

#### 3.2.3 Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
6. Compliance with the spectrum mask is tested using a spectrum analyzer with RB set to a 1kHz for the band 13.553~13.567MHz.

3.2.4 Test Setup Layout



3.2.5 Test Deviation

There is no deviation with the original standard.

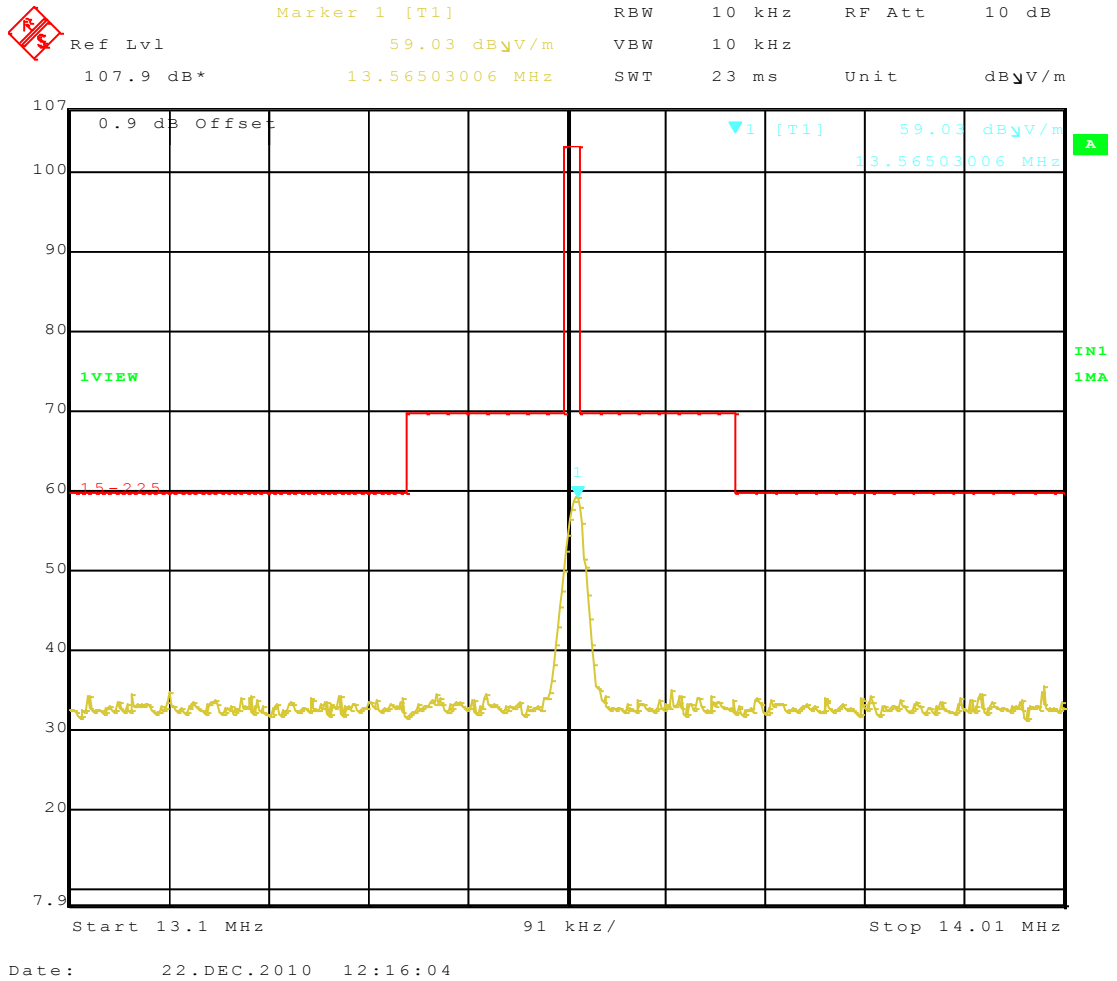
3.2.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.2.7 Test Result of Field Strength of Fundamental Emissions

<b>Final Test Date</b>	Dec. 22, 2010	<b>Test Site No.</b>	10CH02-HY
<b>Temperature</b>	24.2°C	<b>Humidity</b>	58%
<b>Test Engineer</b>	Vic	<b>Configurations</b>	Ch. 1

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m) at 10m	Remark
13.56 MHz	59.03	-43.97	103	QP



Note:  
 Emission level (dBuV/m) = 20 log Emission level (uV/m).  
 Distance extrapolation factor = 40 log (specific distance / test distance) (dB);  
 Limit line = specific limits (dBuV) + distance extrapolation factor.

**3.3 20dB Spectrum Bandwidth Measurement**

**3.3.1 Limit**

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 ~ 13.567MHz).

**3.3.2 Measuring Instruments and Setting**

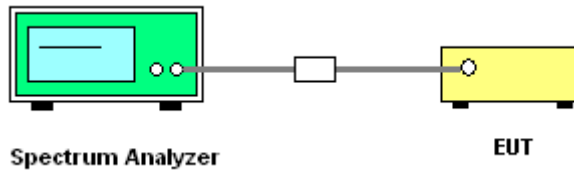
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

<b>Spectrum Parameters</b>	<b>Setting</b>
Attenuation	Auto
Span Frequency	> 20dB Bandwidth
RB	1 kHz
VB	1 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

**3.3.3 Test Procedures**

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 1 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

**3.3.4 Test Setup Layout**



**3.3.5 Test Deviation**

There is no deviation with the original standard.

**3.3.6 EUT Operation during Test**

The EUT was programmed to be in continuously transmitting mode.

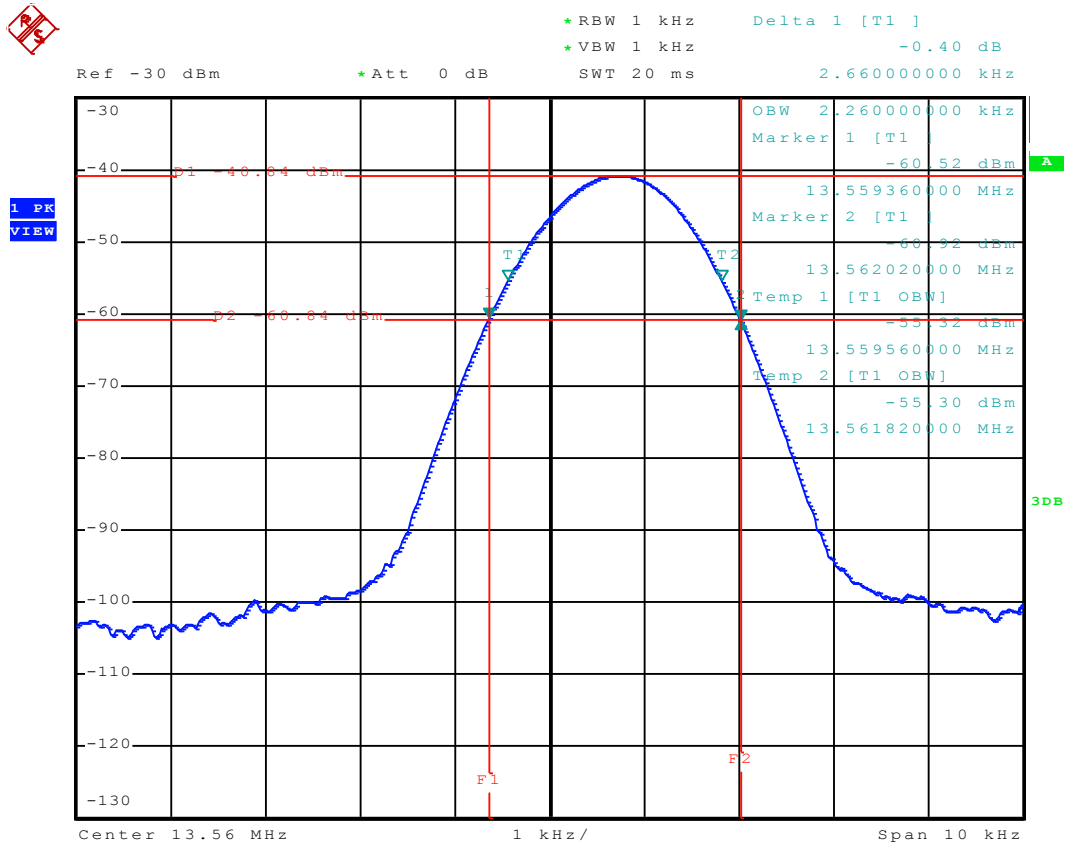


3.3.7 Test Result of 20dB Spectrum Bandwidth

<b>Final Test Date</b>	Dec. 20, 2010	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	23°C	<b>Humidity</b>	60%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	Ch. 1

Frequency	20dB BW (kHz)	99% OBW (kHz)	Frequency range (MHz) f <sub>L</sub> > 13.553MHz	Frequency range (MHz) f <sub>H</sub> < 13.567MHz	Test Result
13.56 MHz	2.66	2.26	13.5594	13.5620	Complies

20 dB/99% Bandwidth Plot on 13.56 MHz



Date: 20.DEC.2010 15:39:13

**3.4 Radiated Emissions Measurement**

**3.4.1 Limit**

The field strength of any emissions which appear outside of 13.553 ~ 13.567MHz band shall not exceed the general radiated emissions limits in Section 15.209(a)

<b>Frequencies (MHz)</b>	<b>Field Strength (micровolts/meter)</b>	<b>Measurement Distance (meters)</b>
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

**3.4.2 Measuring Instruments and Setting**

Please refer to section 4 of equipments list in this report. The following table is the setting of receiver.

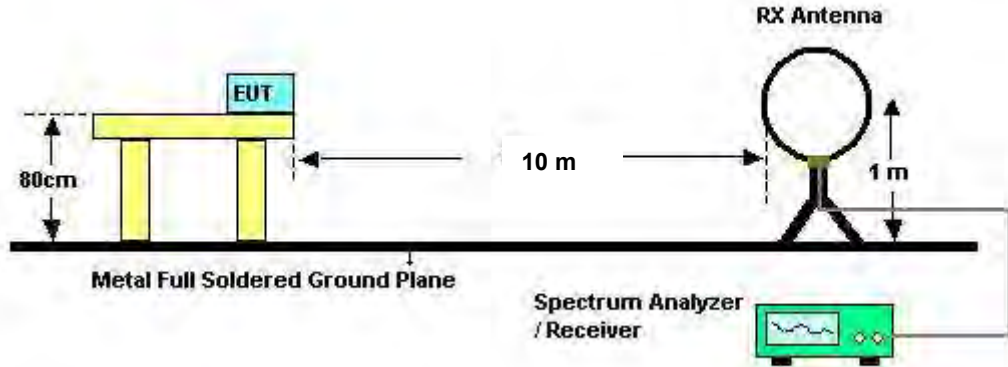
<b>Receiver Parameter</b>	<b>Setting</b>
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

**3.4.3 Test Procedures**

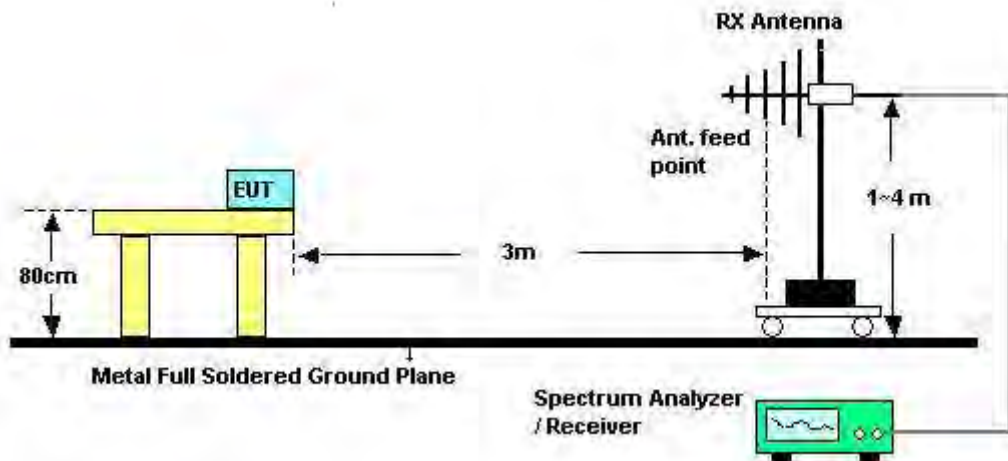
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

3.4.4 Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.4.5 Test Deviation

There is no deviation with the original standard.

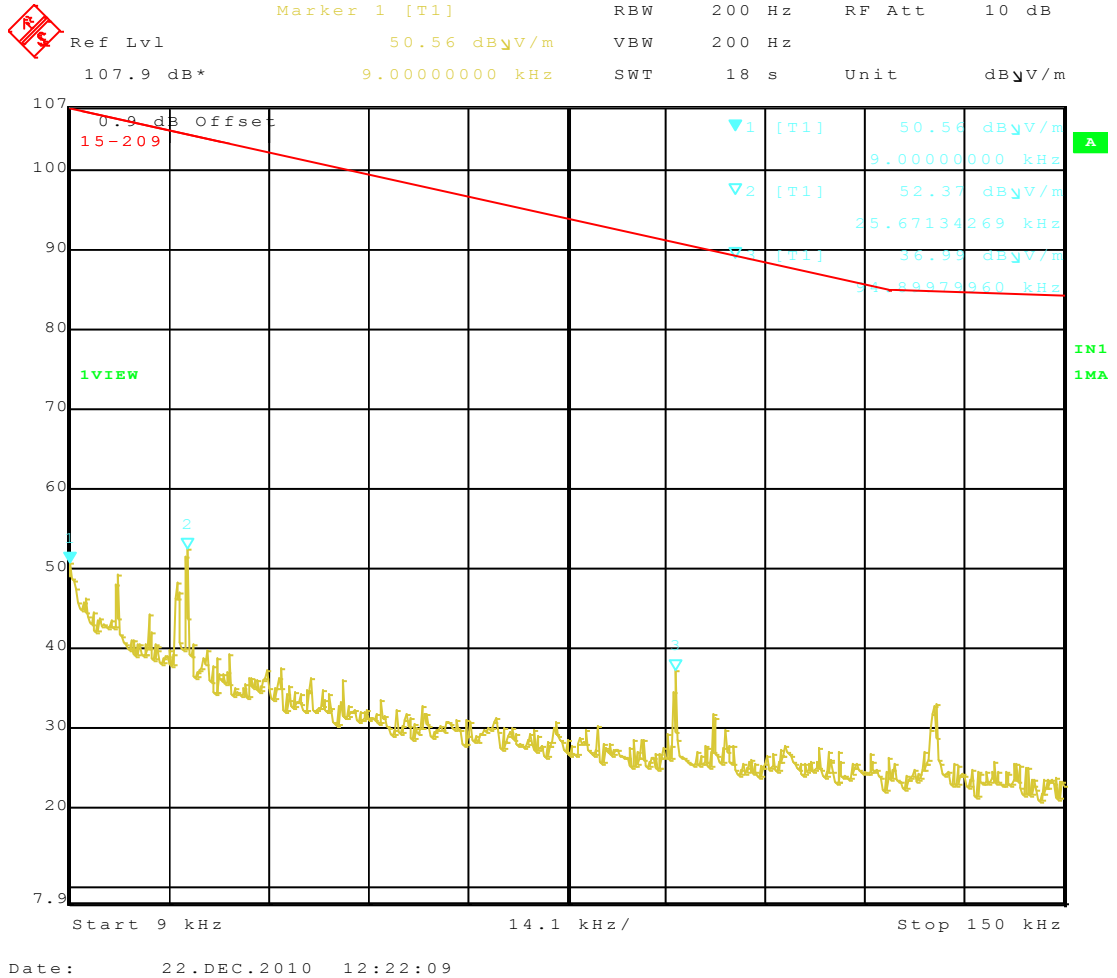
3.4.6 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.4.7 Results of Radiated Emissions (9kHz~30MHz)

Final Test Date	Dec. 22, 2010	Test Site No.	10CH02-HY
Temperature	24.2°C	Humidity	58%
Test Engineer	Vic	Configurations	Ch. 1

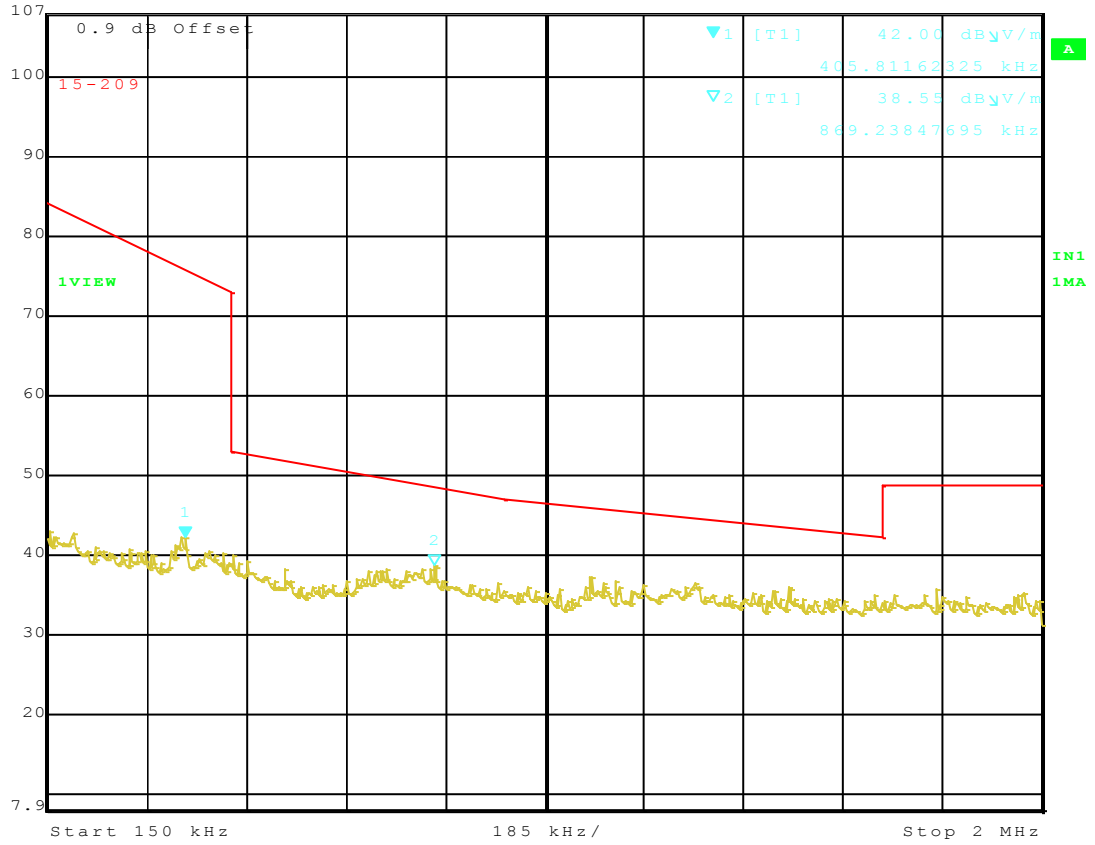
9KHz~150KHz



150KHz~2MHz



Marker 1 [T1] RBW 10 kHz RF Att 10 dB  
 Ref Lvl 42.00 dBV/m VBW 10 kHz  
 107.9 dB\* 405.81162325 kHz SWT 47 ms Unit dBV/m

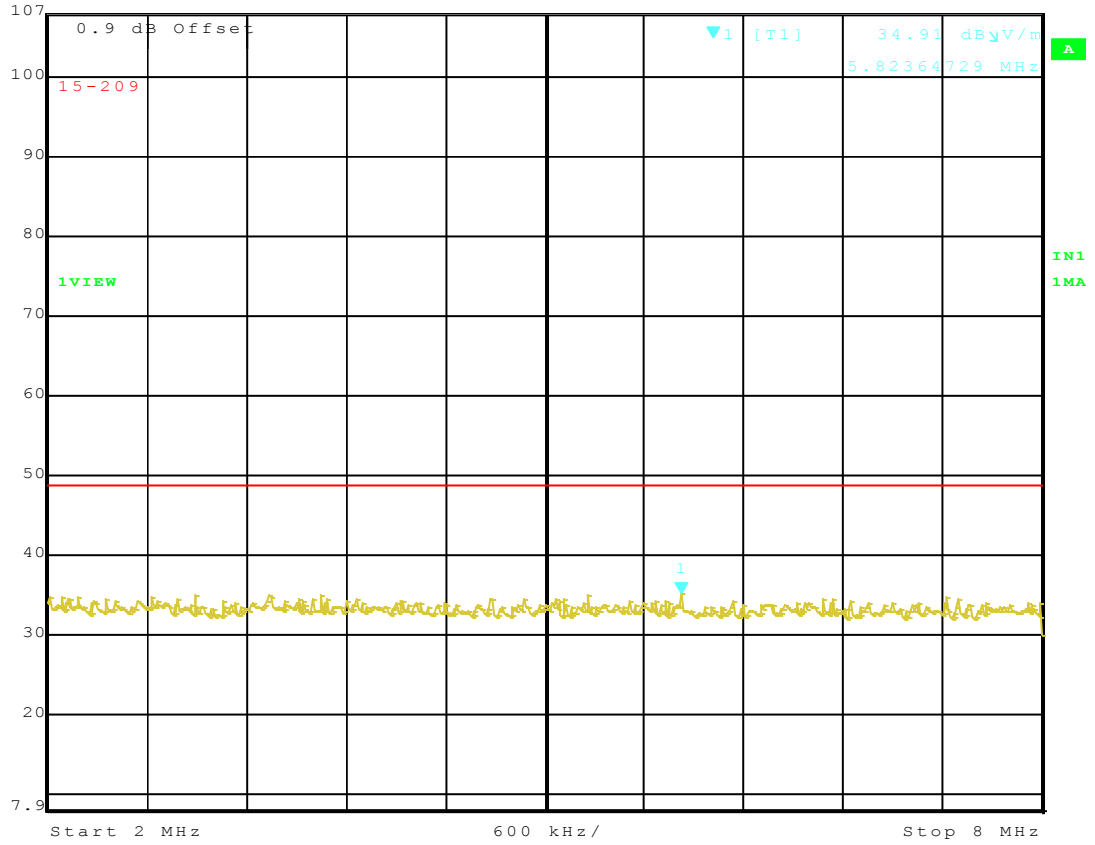


Date: 22.DEC.2010 12:25:55

2MHz~8MHz



Marker 1 [T1] RBW 10 kHz RF Att 10 dB  
 Ref Lvl 34.91 dB $\mu$ V/m VBW 10 kHz  
 107.9 dB\* 5.82364729 MHz SWT 150 ms Unit dB $\mu$ V/m

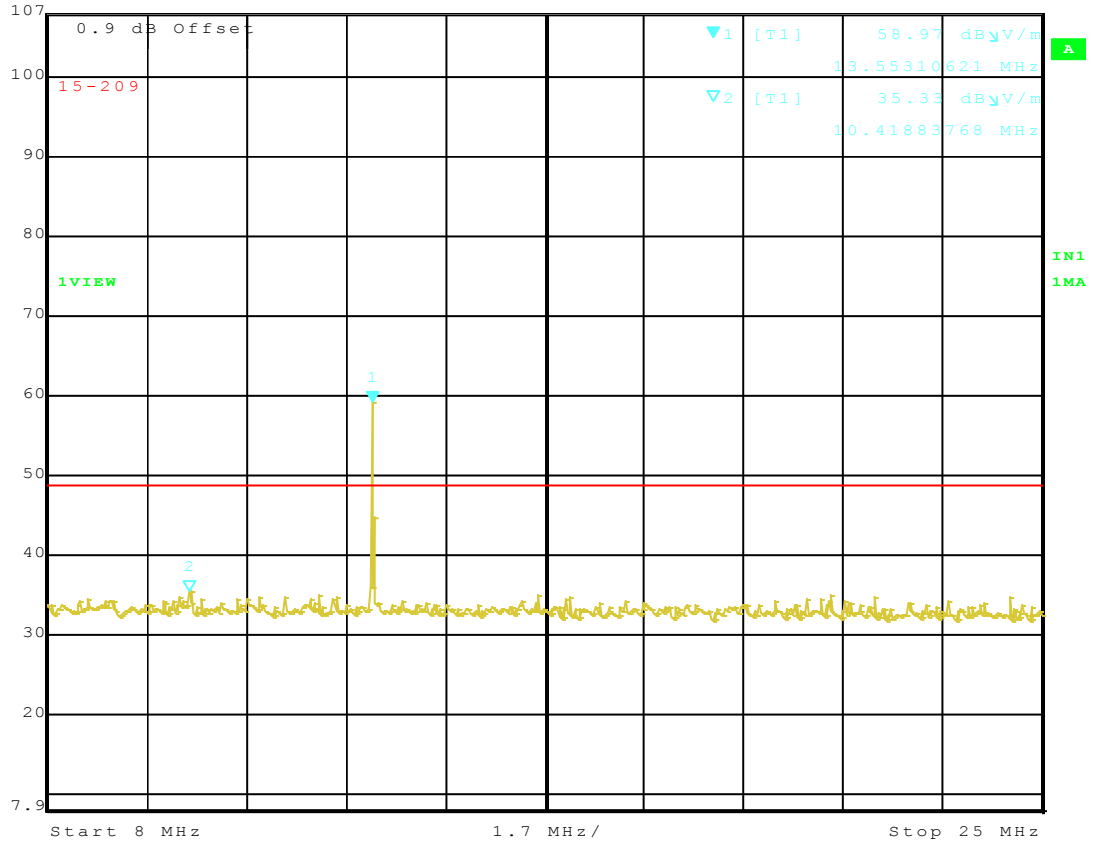


Date: 22.DEC.2010 12:28:18

8MHz~25MHz



Marker 1 [T1] RBW 10 kHz RF Att 10 dB  
 Ref Lvl 58.97 dByV/m VBW 10 kHz  
 107.9 dB\* 13.55310621 MHz SWT 430 ms Unit dByV/m



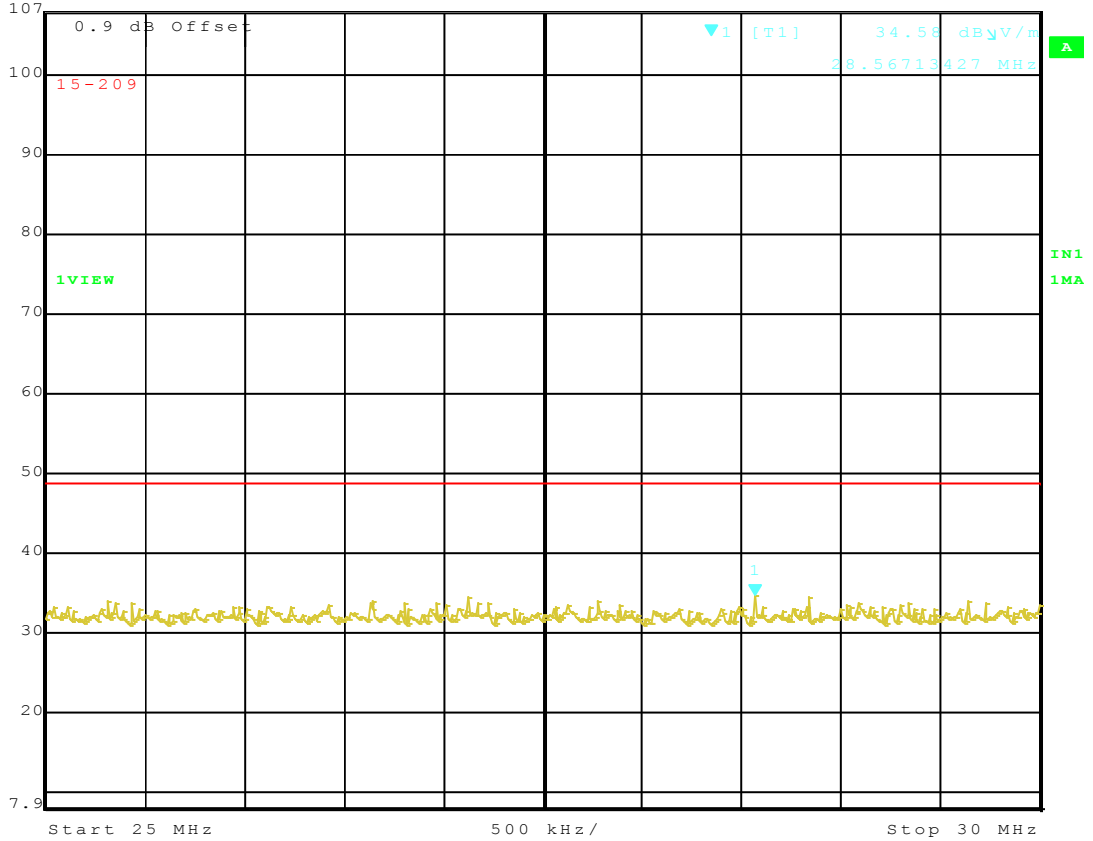
Date: 22.DEC.2010 12:31:41

Note: A mark 1 is Fundamental Emissions.

25MHz~30MHz



Marker 1 [T1] RBW 10 kHz RF Att 10 dB  
 Ref Lvl 34.58 dBV/m VBW 10 kHz  
 107.9 dB\* 28.56713427 MHz SWT 125 ms Unit dBV/m



Date: 22.DEC.2010 12:33:31

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);

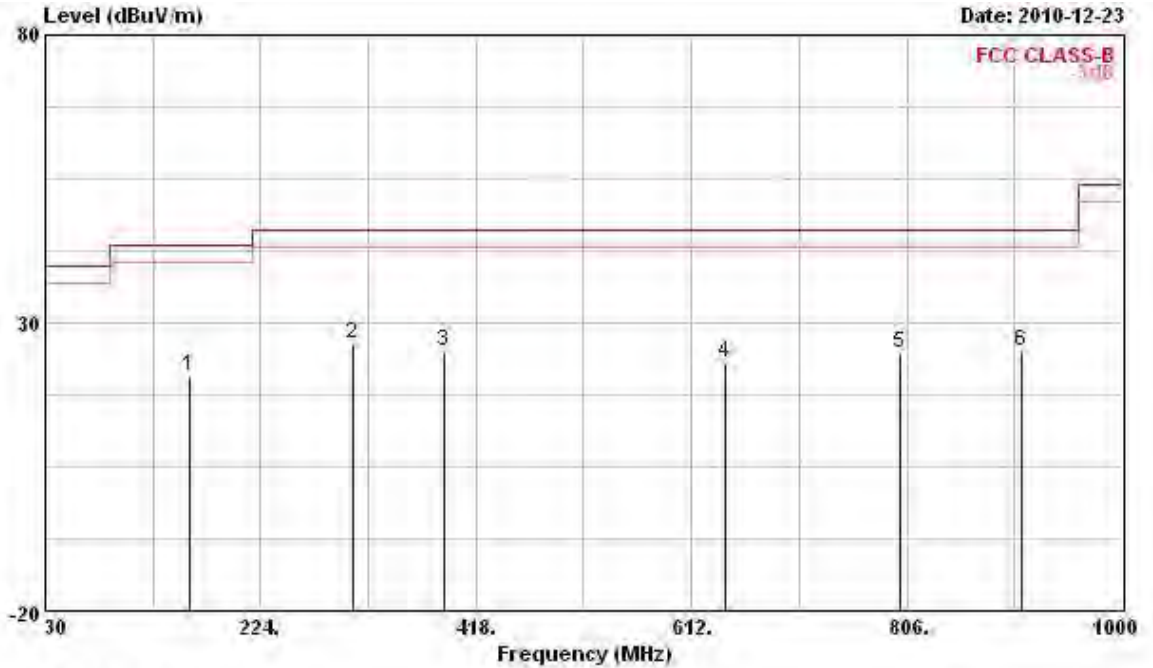
Limit line = specific limits (dBuV) + distance extrapolation factor.



3.4.8 Results for Radiated Emissions (30MHz~1GHz)

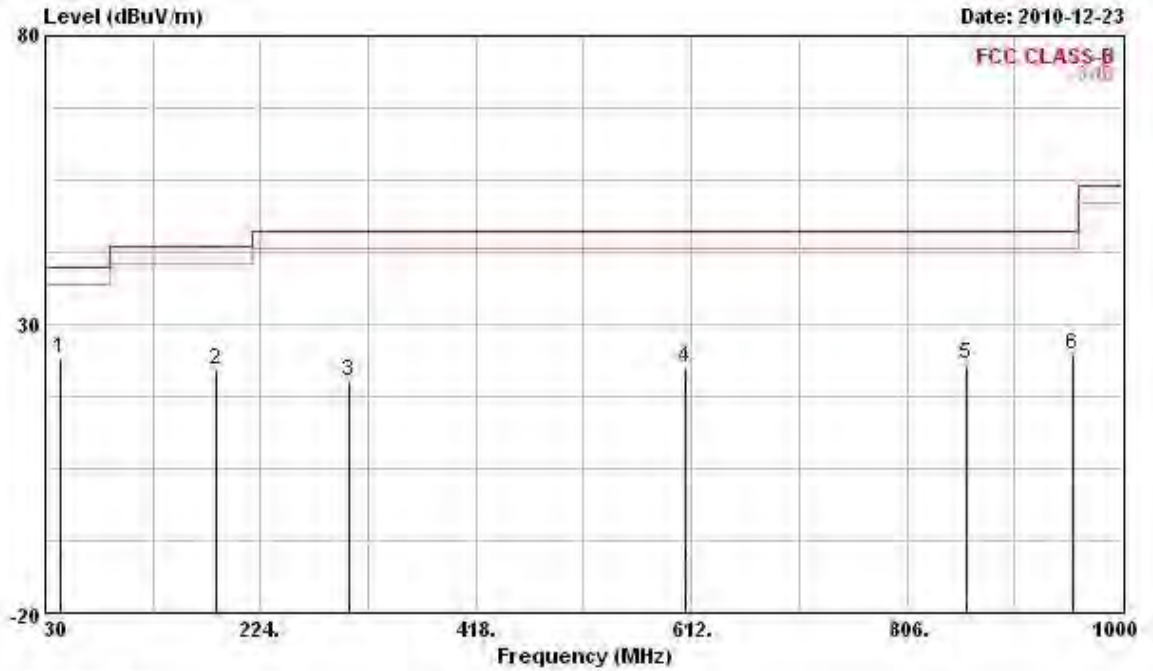
Final Test Date	Dec. 23, 2010	Test Site No.	03CH02-HY
Temperature	24°C	Humidity	55%
Test Engineer	Chris	Configurations	Ch.1

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	159.980	20.86	-22.64	43.50	35.59	10.55	2.09	27.37	Peak
2	307.420	26.45	-19.55	46.00	36.55	13.82	2.93	26.85	Peak
3	389.870	25.00	-21.00	46.00	34.20	15.10	3.27	27.57	Peak
4	642.070	23.13	-22.87	46.00	27.40	19.62	4.22	28.11	Peak
5	800.180	24.63	-21.37	46.00	27.31	20.27	4.77	27.72	Peak
6	908.820	25.18	-20.82	46.00	27.22	20.25	5.04	27.33	Peak

Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	43.580	24.06	-15.94	40.00	38.51	12.27	1.04	27.76	Peak
2	184.230	22.08	-21.42	43.50	36.88	10.19	2.23	27.22	Peak
3	303.540	20.29	-25.71	46.00	30.43	13.76	2.92	26.82	Peak
4	607.150	22.53	-23.47	46.00	26.55	20.09	4.05	28.16	Peak
5	859.350	23.14	-22.86	46.00	25.61	20.13	4.89	27.49	Peak
6	955.380	24.85	-21.15	46.00	25.37	21.40	5.27	27.19	Peak

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

**3.5 Frequency Stability Measurement**

**3.5.1 Limit**

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (100ppm) 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.

**3.5.2 Measuring Instruments and Setting**

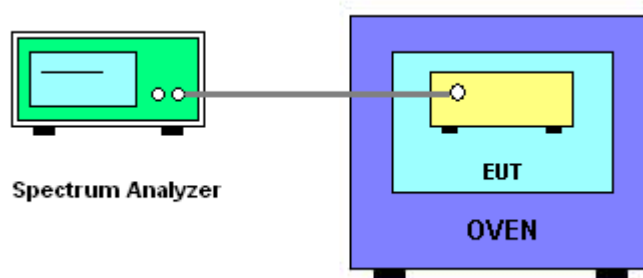
Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

<b>Spectrum Parameter</b>	<b>Setting</b>
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RB	1 kHz
VB	1 kHz
Sweep Time	Auto

**3.5.3 Test Procedures**

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 1 kHz with peak detector and maxhold settings.
5.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f) / f_c \times 10^6$  ppm and the limit is less than  $\pm 100$ ppm.
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is -20°C~50°C.

**3.5.4 Test Setup Layout**



**3.5.5 Test Deviation**

There is no deviation with the original standard.

**3.5.6 EUT Operation during Test**

The EUT was programmed to be in continuously un-modulation transmitting mode.

**3.5.7 Test Result of Frequency Stability**

<b>Final Test Date</b>	Dec. 20, 2010	<b>Test Site No.</b>	TH01-HY
<b>Temperature</b>	23°C	<b>Humidity</b>	60%
<b>Test Engineer</b>	Ian	<b>Configurations</b>	Ch. 1

**Voltage vs. Frequency Stability**

<b>Voltage</b>	<b>Measurement Frequency (MHz)</b>
<b>(V)</b>	<b>13.56 MHz</b>
<b>126.5</b>	13.560769
<b>110</b>	13.560769
<b>93.5</b>	13.560769
Max. Deviation (MHz)	<b>0.000769</b>
Max. Deviation (ppm)	<b>56.73</b>

**Temperature vs. Frequency Stability**

<b>Temperature</b>	<b>Measurement Frequency (MHz)</b>
<b>(°C)</b>	<b>13.56 MHz</b>
<b>-20</b>	13.560743
<b>-10</b>	13.560742
<b>0</b>	13.560740
<b>10</b>	13.560720
<b>20</b>	13.560700
<b>30</b>	13.560660
<b>40</b>	13.560760
<b>50</b>	13.560680
Max. Deviation (MHz)	<b>0.000760</b>
Max. Deviation (ppm)	<b>56.05</b>

### **3.6 Antenna Requirements**

#### **3.6.1 Limit**

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

#### **3.6.2 Antenna Connector Construction**

Please refer to section 2.1 in this test report; antenna connector complied with the requirements.

**4. LIST OF MEASURING EQUIPMENTS**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9kHz – 2.75GHz	Sep. 01, 2009	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001/004	9kHz – 30MHz	Jan. 19, 2010	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001/009	9kHz – 30MHz	Feb. 24, 2009	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 – 60Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832010001	9kHz – 30MHz	May 05, 2009	Conduction (CO01-HY)
Isolation Transformer	Erika Fiedler OHG	D-65396 Walluf	58	45MHz-2.15GHz	N/A	Conduction (CO01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Nov. 19, 2010	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Apr. 16, 2010	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Oct. 22, 2010	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 02, 2010	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 02, 2010	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 30, 2010	Conducted (TH01-HY)
Power Sensor	Anritsu	MA2411B	0917017	300MHz~40GHz	Dec. 03, 2010	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	0949003	300MHz~40GHz	Dec. 03, 2010	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	Jul. 26, 2010*	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is two year.

**For Radiated emissions 9kHz~30MHz**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
10m Semi Anechoic Chamber	TDK	SAC-10M	10CH02-HY	30MHz~1GHz 10m,3m	Nov. 28, 2010	Radiation (10CH02-HY)
Amplifier	AGILENT	8447D	2944A10827	100KHz – 1.3GHz	May 14, 2010	Radiation (10CH02-HY)
Amplifier	AGILENT	8447D	2944A10828	100KHz – 1.3GHz	May 14, 2010	Radiation (10CH02-HY)
Receiver	R&S	ESI	838496/008	20Hz - 7GHz	Apr. 26, 2010	Radiation (10CH02-HY)
Spectrum Analyzer	R&S	FSP7	100645	9KHz – 7GHz	Aug. 10, 2010	Radiation (10CH02-HY)
Biconical Antenna	Schwarzbeck	VHBB 9124	287	30MHz –200MHz	Dec. 20, 2010	Radiation (10CH02-HY)
Log Antenna	Schwarzbeck	VUSLP 9111	207	200MHz -1GHz	Dec. 20, 2010	Radiation (10CH02-HY)
Turn Table	HD	DS 430	430/360	0 ~ 360 degree	N/A	Radiation (10CH02-HY)
Antenna Mast	HD	MA240	240/664	1 m - 4 m	N/A	Radiation (10CH02-HY)
Antenna Mast	HD	MA240	240/667	1 m - 4 m	N/A	Radiation (10CH02-HY)
RF Cable-R10m	Jye Bao	RG142	CB027-INSIDE	30MHz~1GHz	Feb. 12, 2010	Radiation (10CH02-HY)
RF Cable-R10m	Suhner Switzerland + BELDEN	RG223/U + RG8/U	CB026-DOOR	30MHz~1GHz	Feb. 12, 2010	Radiation (10CH02-HY)

Note: Calibration Interval of instruments listed above is one year.

**For Radiated emissions 30MHz~1GHz**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Bilog Antenna	SCHAFFNER	CBL61128	2723	30 MHz - 2 GHz	Oct. 16, 2010	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Feb. 26, 2010	Radiation (03CH02-HY)
Spectrum Analyzer	R&S	FSP40	100305/040	9 kHz - 40GHz	Feb. 02, 2010	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30 MHz - 1 GHz 3m	May 01, 2010	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100 kHz – 1.3 GHz	Jul. 23, 2010	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 - 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul. 29, 2010**	Radiation (10CH02-HY) (03CH02-HY)

Note: Calibration Interval of instruments listed above is two year.

**5. TEST LOCATION**

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 <sup>nd</sup> Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 728, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085



6. TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-100529

**財團法人全國認證基金會**  
Taiwan Accreditation Foundation

## Certificate of Accreditation

This is to certify that

**Sporton International Inc.**  
**EMC & Wireless Communications Laboratory**  
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,  
Taiwan, R.O.C.

**is accredited in respect of laboratory**

<b>Accreditation Criteria</b>	: ISO/IEC 17025:2005
<b>Accreditation Number</b>	: 1190
<b>Originally Accredited</b>	: December 15, 2003
<b>Effective Period</b>	: January 10, 2010 to January 09, 2013
<b>Accredited Scope</b>	: Testing Field, see described in the Appendix
<b>Specific Accreditation Program</b>	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities



Jay-San Chen  
President, Taiwan Accreditation Foundation  
Date : May 29, 2010

PI, total 23 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix