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FCC RADIO TEST REPORT

Applicant's company	Sony Corporation
Applicant Address	1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan
FCC ID	AK8SVF13NA1EL
Manufacturer's company	Sony Corporation
Manufacturer Address	1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan

Product Name	Personal Computer
Brand Name	SONY
Model Name	SVF13NA1EL
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.225
Test Freq. Range	13.553 ~ 13.567MHz
Received Date	Jul. 26, 2013
Final Test Date	Oct. 17, 2013
Submission Type	Original Equipment

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 C63.10-2009** and **47 CFR FCC Part 15 Subpart C**.

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



Table of Contents

1. CERTIFICATE OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Accessories.....	3
3.3. Table for Test Modes.....	3
3.4. Table for Testing Locations.....	4
3.5. Table for Supporting Units	4
3.6. EUT Operation during Test	4
3.7. Test Configurations	5
4. TEST RESULT	7
4.1. AC Power Line Conducted Emissions Measurement.....	7
4.2. Field Strength of Fundamental Emissions and Mask Measurement	11
4.3. 20dB Spectrum Bandwidth Measurement	14
4.4. Radiated Emissions Measurement	17
4.5. Frequency Stability Measurement	27
4.6. Antenna Requirements	29
5. LIST OF MEASURING EQUIPMENTS	30
6. TEST LOCATION.....	31
7. MEASUREMENT UNCERTAINTY.....	32
APPENDIX A. TEST PHOTOS	A1 ~ A4



History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR372647AE	Rev. 01	Initial issue of report	Oct. 17, 2013



1. CERTIFICATE OF COMPLIANCE

Product Name : Personal Computer
Brand Name : SONY
Model Name : SVF13NA1EL
Applicant : Sony Corporation
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.225

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jul. 26, 2013 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.

A handwritten signature in blue ink that reads 'Sam Chen'. The signature is written in a cursive style and is positioned above a horizontal line.

Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	Rule Section	Description of Test	Result	Under Limit
4.1	15.207	AC Power Line Conducted Emissions	Complies	12.19 dB
4.2	15.225(a)	Field Strength of Fundamental Emissions and Mask	Complies	70.31 dB
4.3	15.215(c)	20dB Spectrum Bandwidth	Complies	-
4.4	15.225(d)	Radiated Emissions	Complies	3.15 dB
4.5	15.225(e)	Frequency Stability	Complies	-
4.6	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Power Type	From power adapter and battery
Modulation	ASK
Channel Number	1
Channel Band Width (99%)	2.61 kHz
Max. Field Strength	53.69 dBuV/m at 3m (peak)
Carrier Frequencies	13.56 MHz (CH 1)
Antenna	Internal Antenna (Without any antenna connector)

3.2. Accessories

Power	Brand	Model	Rating
Adapter	SONY	VGP-AC19V73	Input: 100-240Vac, 50/60Hz, 1.0A Output1: 19.5Vdc, 2.0A Output2: 5.0Vdc, 1.0A
LITHIUM ION BATTERY	SONY	VGP-BPS41	11.25Vdc, 3140mAh

3.3. 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	CTX	-	-
Field Strength of Fundamental Emissions	CTX	1	1
20dB Spectrum Bandwidth	CTX	1	1
Radiated Emissions 9kHz~30MHz	CTX	1	1
Radiated Emissions 30MHz~1GHz	CTX	-	-
Frequency Stability	Un-modulation	1	1

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. EUT (CTX) with 2.4GHz WLAN, BT and NFC function

Mode 2. EUT (CTX) with 5GHz WLAN, BT and NFC function

Mode 1 is the worst case, so it was selected to record in this test report.

For Radiated Emission test:

The EUT for Radiated emission test was performed at stand, laptop and slate mode. The worst-case was found at laptop mode (9kHz~30MHz) and slate mode (30MHz~1GHz) and. So the measurement will follow this same test configuration.

For 9kHz~30MHz:

Mode 1: EUT (CTX) – Laptop Mode

For 30MHz~1GHz:

Mode 1: EUT (CTX) with 2.4GHz WLAN, BT and NFC function – Slate Mode

Mode 2: EUT (CTX) with 5GHz WLAN, BT and NFC function – Slate Mode

Mode 1 is the worst case, so it was selected to record in this test report.

3.4. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH02-HY	SAC	Hwa Ya	101377	IC 4086B	-
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D	-
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D	-
TH01-HY	OVEN Room	Hwa Ya	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

Please refer section 6 for Test Site Address.

3.5. Table for Supporting Units

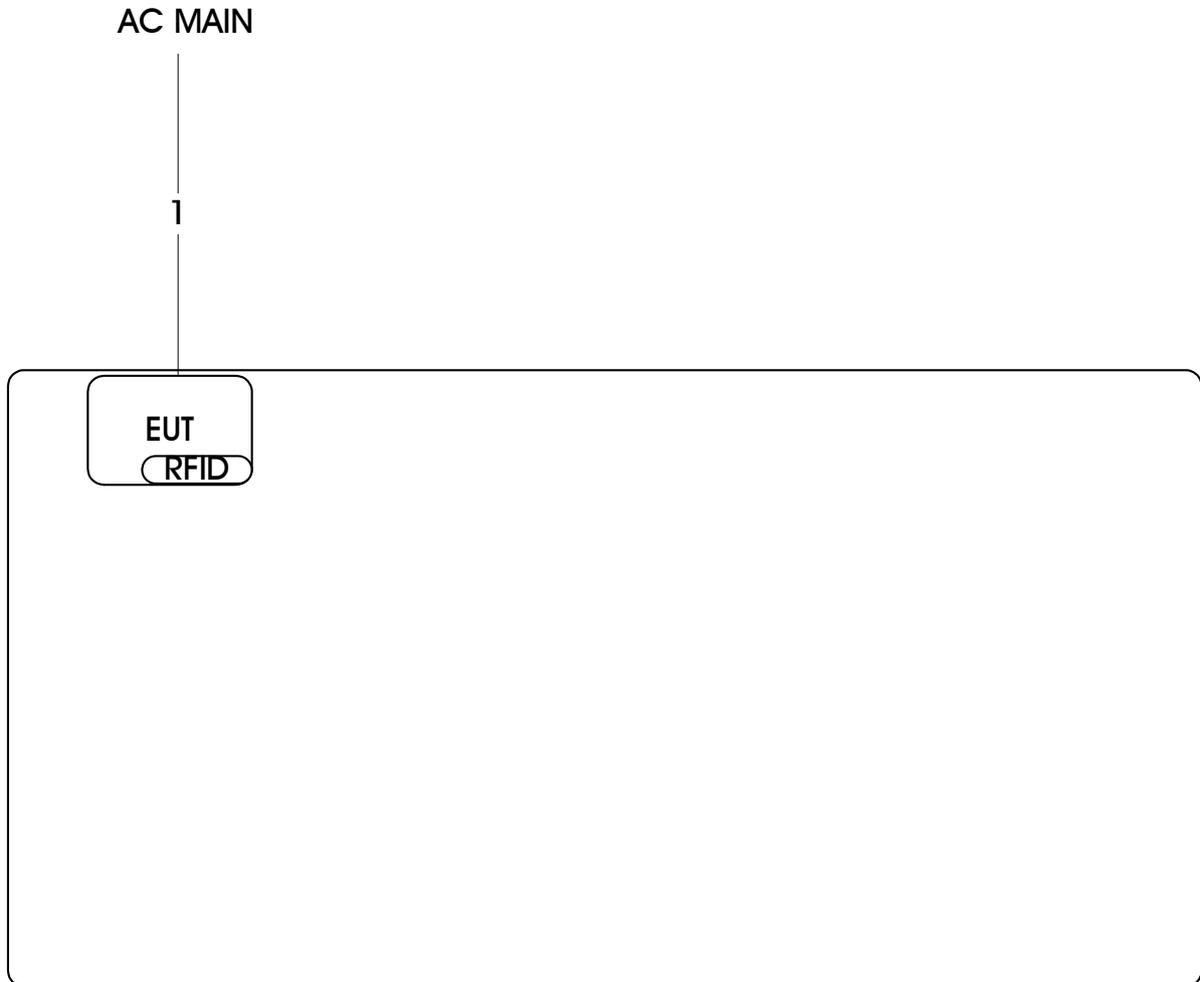
Support Unit	Brand	Model	FCC ID
RFID Card	-	-	-

3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

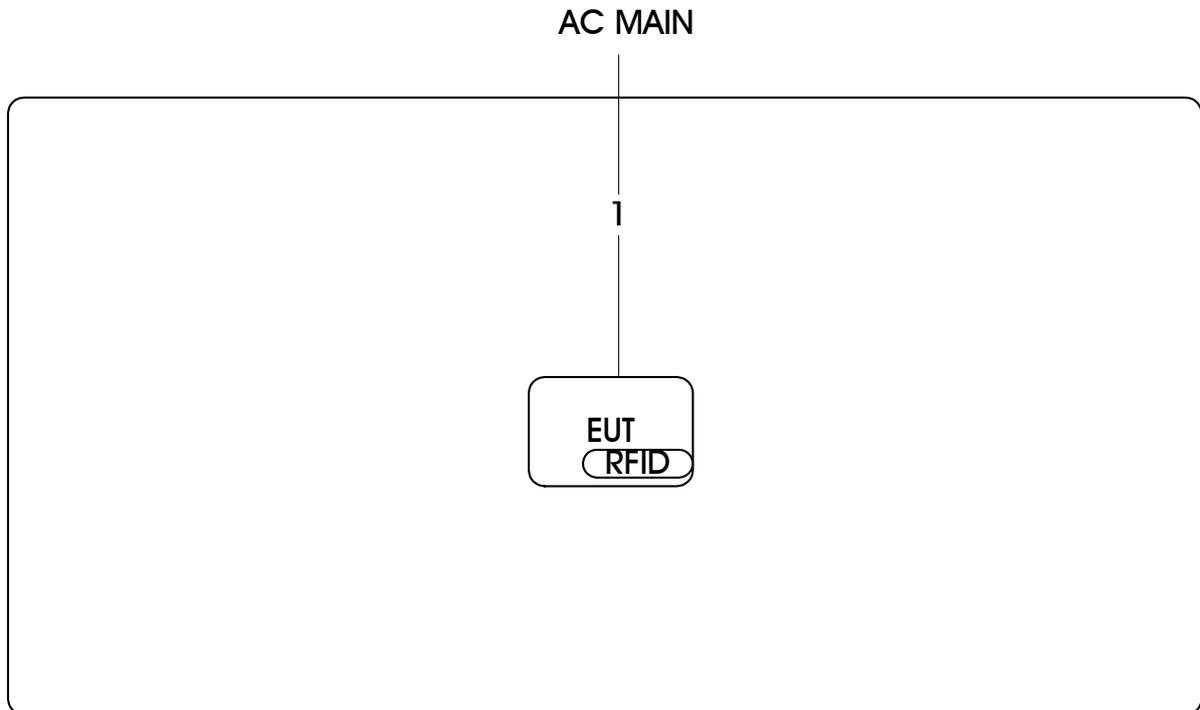
3.7. Test Configurations

3.7.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length(m)	Remark
1	Power Cable	No	2.6m	-

3.7.2. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length(m)	Remark
1	Power Cable	No	2.6m	-

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product 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

4.1.2. Measuring Instruments and Setting

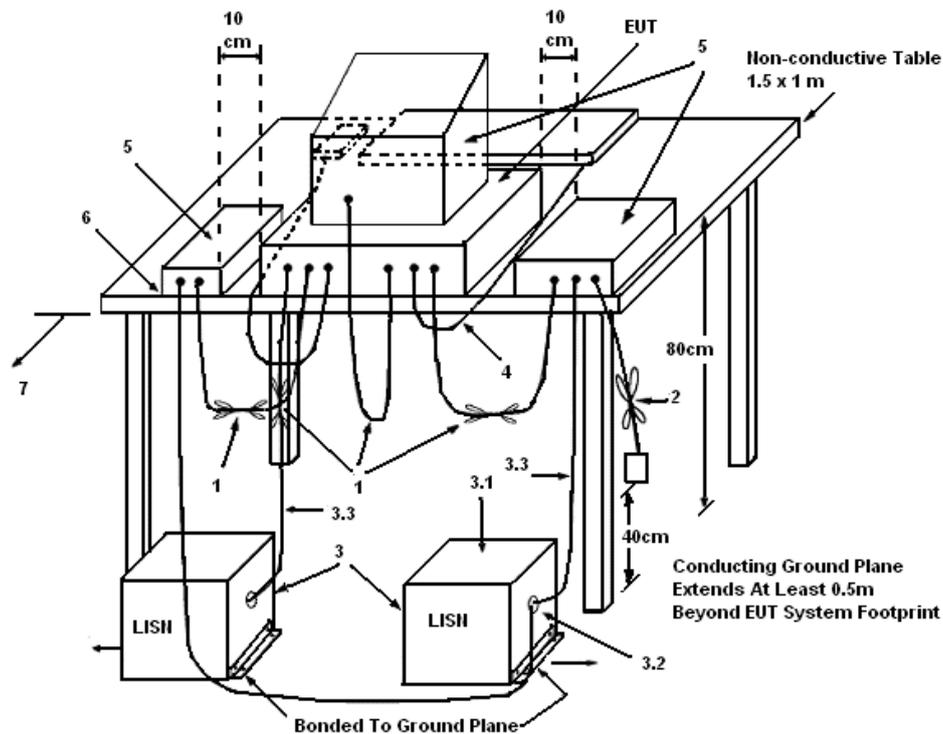
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. 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.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. 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.

4.1.5. Test Deviation

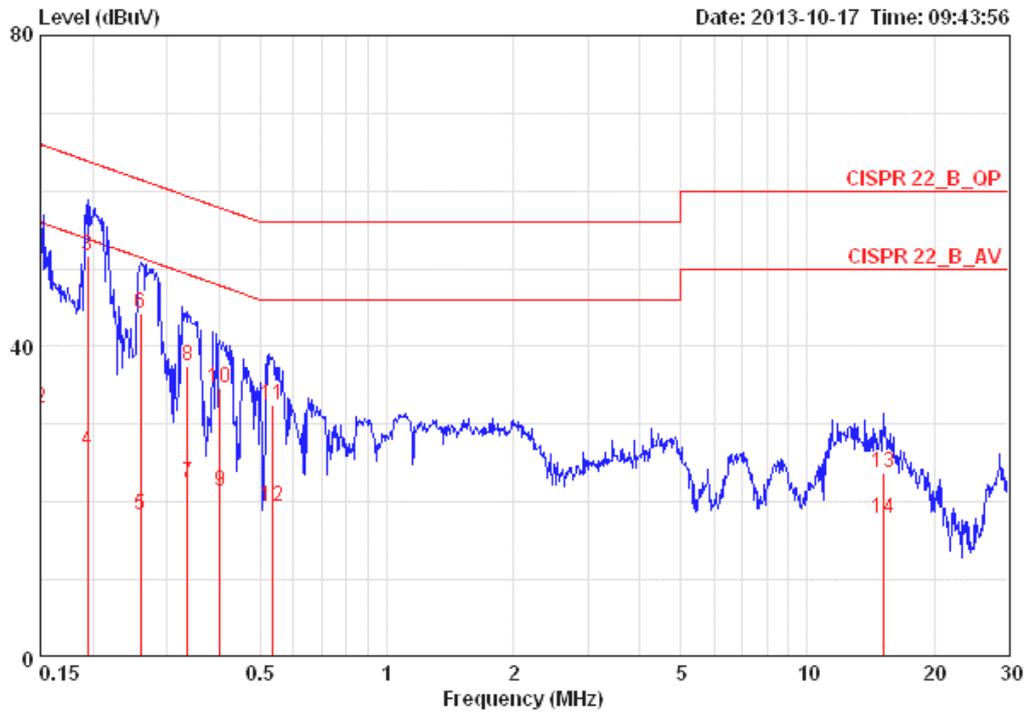
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

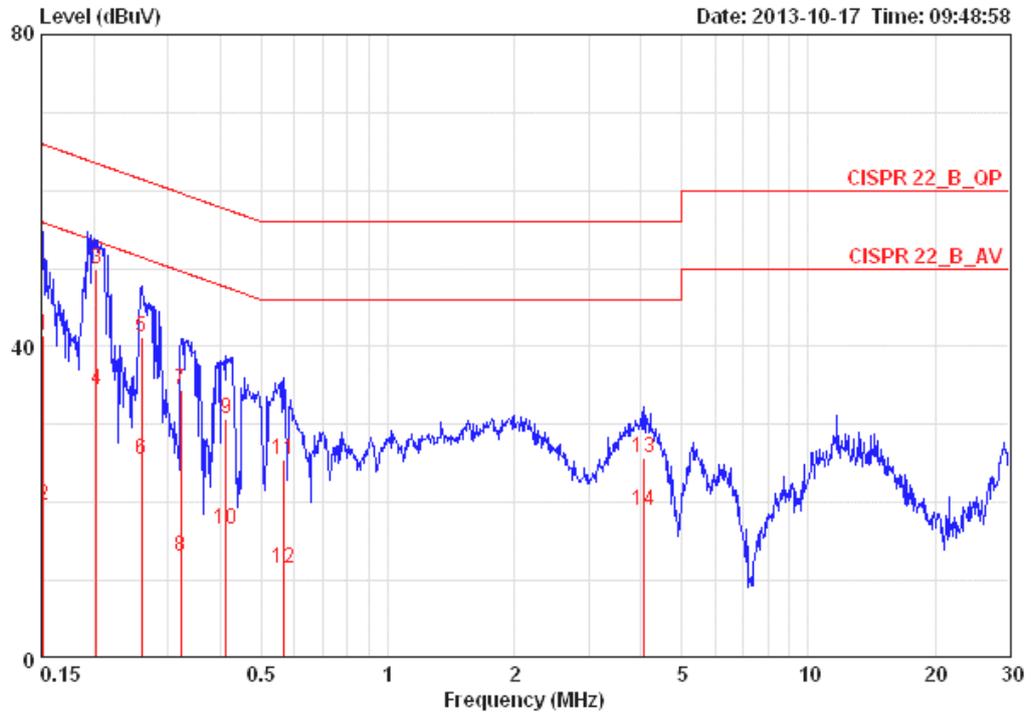
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	48%
Test Engineer	Sin Chang	Phase	Line
Configuration	Mode 1		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.15000	47.32	-18.68	66.00	46.99	0.15	0.18	LINE	QP
2	0.15000	32.09	-23.91	56.00	31.76	0.15	0.18	LINE	AVERAGE
3	0.19447	51.66	-12.19	63.84	51.31	0.15	0.20	LINE	QP
4	0.19447	26.66	-27.19	53.84	26.31	0.15	0.20	LINE	AVERAGE
5	0.26026	18.33	-33.09	51.42	17.98	0.15	0.20	LINE	AVERAGE
6	0.26026	44.24	-17.18	61.42	43.89	0.15	0.20	LINE	QP
7	0.33562	22.51	-26.80	49.31	22.16	0.15	0.20	LINE	AVERAGE
8	0.33562	37.50	-21.81	59.31	37.15	0.15	0.20	LINE	QP
9	0.40187	21.47	-26.34	47.81	21.12	0.15	0.20	LINE	AVERAGE
10	0.40187	34.73	-23.08	57.81	34.38	0.15	0.20	LINE	QP
11	0.53498	32.50	-23.50	56.00	32.15	0.15	0.20	LINE	QP
12	0.53498	19.38	-26.62	46.00	19.03	0.15	0.20	LINE	AVERAGE
13	15.146	23.73	-36.27	60.00	22.83	0.49	0.41	LINE	QP
14	15.146	17.82	-32.18	50.00	16.92	0.49	0.41	LINE	AVERAGE

Temperature	24°C	Humidity	48%
Test Engineer	Sin Chang	Phase	Neutral
Configuration	Mode 1		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.15160	41.32	-24.59	65.91	41.07	0.07	0.18	NEUTRAL	QP
2	0.15160	19.57	-36.34	55.91	19.32	0.07	0.18	NEUTRAL	AVERAGE
3	0.20289	49.90	-13.59	63.49	49.63	0.07	0.20	NEUTRAL	QP
4	0.20289	34.34	-19.15	53.49	34.07	0.07	0.20	NEUTRAL	AVERAGE
5	0.26026	41.23	-20.19	61.42	40.96	0.07	0.20	NEUTRAL	QP
6	0.26026	25.48	-25.94	51.42	25.21	0.07	0.20	NEUTRAL	AVERAGE
7	0.32169	34.55	-25.11	59.66	34.28	0.07	0.20	NEUTRAL	QP
8	0.32169	13.01	-36.65	49.66	12.74	0.07	0.20	NEUTRAL	AVERAGE
9	0.41266	30.82	-26.77	57.59	30.55	0.07	0.20	NEUTRAL	QP
10	0.41266	16.66	-30.93	47.59	16.39	0.07	0.20	NEUTRAL	AVERAGE
11	0.56409	25.43	-30.57	56.00	25.16	0.07	0.20	NEUTRAL	QP
12	0.56409	11.51	-34.49	46.00	11.24	0.07	0.20	NEUTRAL	AVERAGE
13	4.070	25.75	-30.25	56.00	25.32	0.13	0.30	NEUTRAL	QP
14	4.070	19.00	-27.00	46.00	18.57	0.13	0.30	NEUTRAL	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Field Strength of Fundamental Emissions and Mask Measurement

4.2.1. 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 an QP detector.

Frequency Band (MHz)	Fundamental Emissions Limit (dBuV/m) at 3m
13.553 ~ 13.567MHz	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 RBW 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 3m
	1.705~13.110	30	29.5	69.5
	13.110~13.410	106	40.5	80.5
	13.410~13.553	334	50.5	90.5
	13.553~13.567	15848	84.0	124.0
	13.567~13.710	334	50.5	90.5
	13.710~14.010	106	40.5	80.5
	14.010~30.000	30	29.5	69.5

4.2.2. Measuring Instruments and Setting

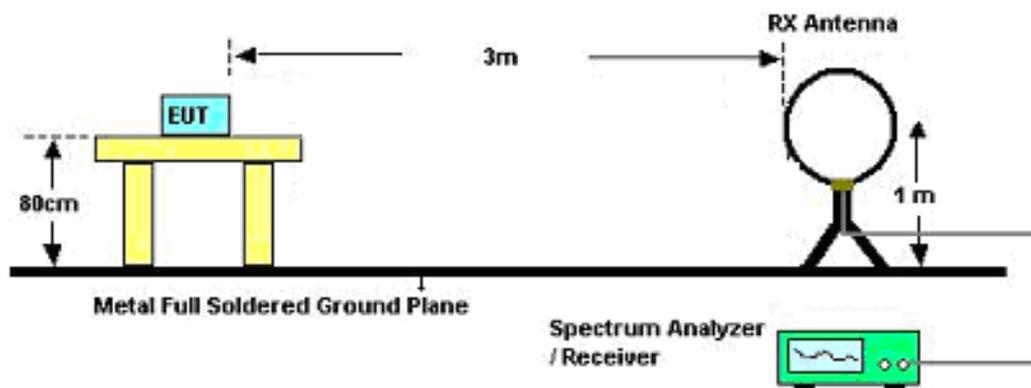
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.2.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. 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 RBW set to a 1kHz for the band 13.553~13.567MHz.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

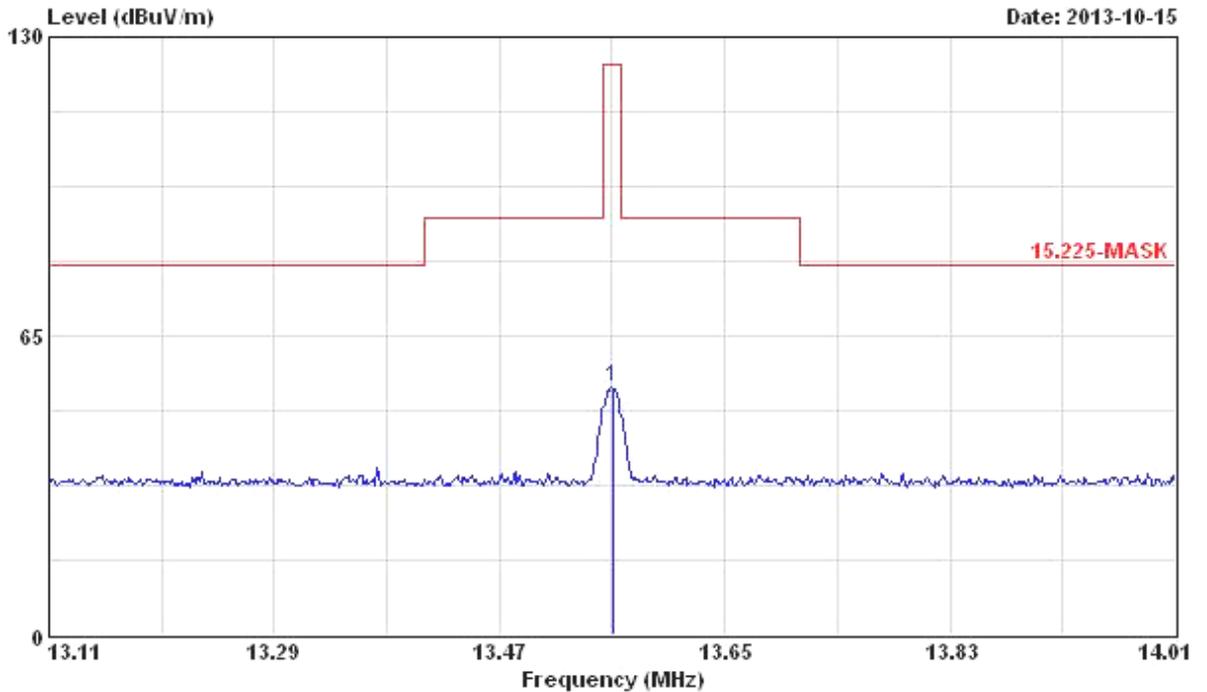
There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Field Strength of Fundamental Emissions and Mask

Temperature	23.9°C	Humidity	54%
Test Engineer	Daniel Hsu	Configurations	Channel 1



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	13.560	53.69	-70.31	124.00	33.11	20.10	0.48	0.00	Peak	---	---

Note:

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

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

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

4.3. 20dB Spectrum Bandwidth Measurement

4.3.1. Limit

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

4.3.2. Measuring Instruments and Setting

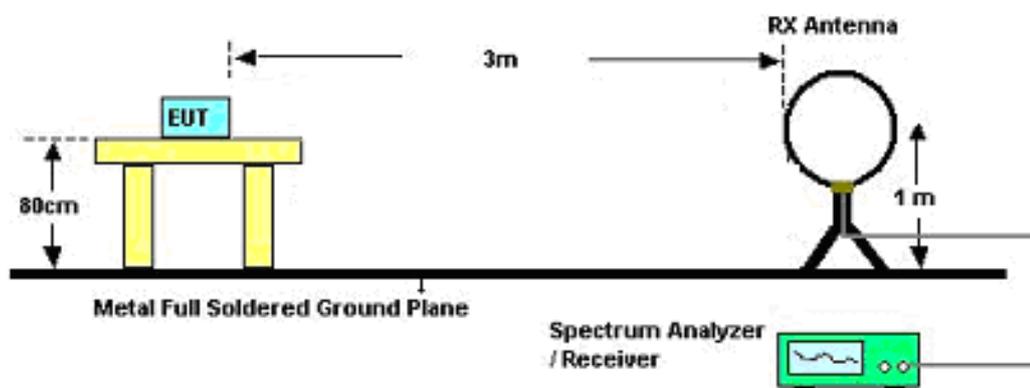
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 20dB Bandwidth
RBW	1 kHz
VBW	1 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.3.3. 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.
4. For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

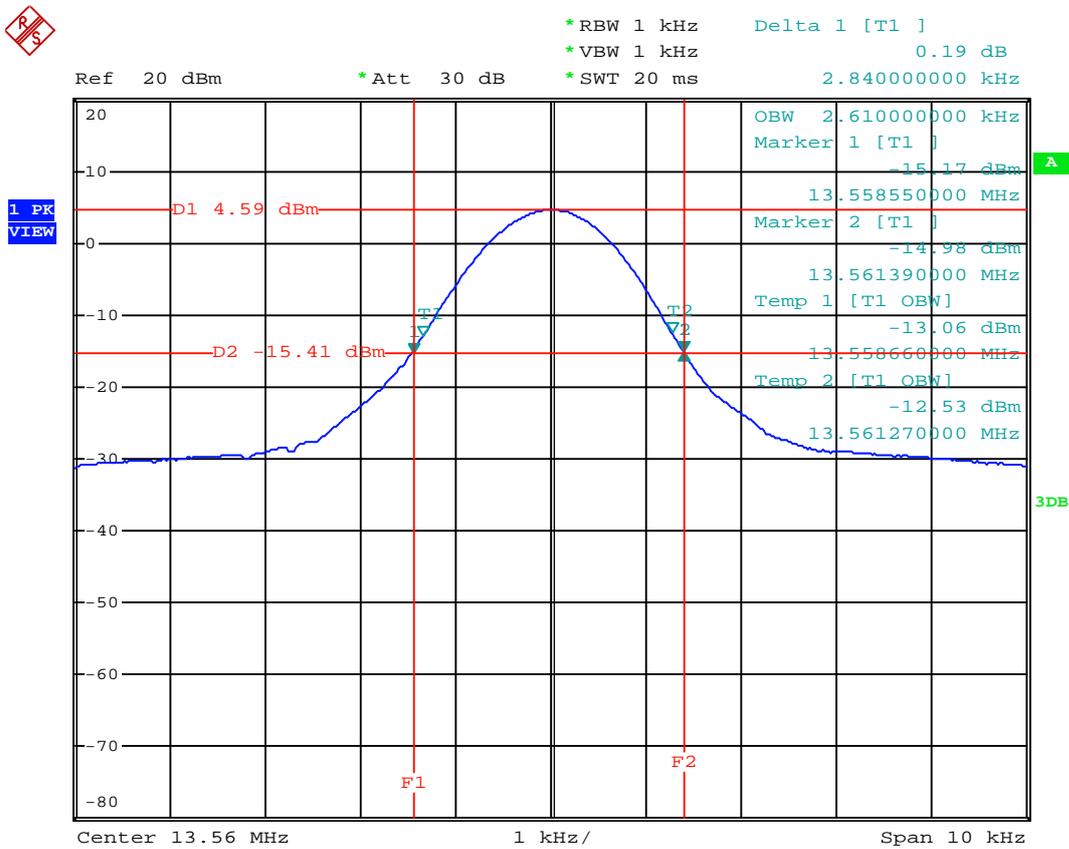
The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of 20dB Spectrum Bandwidth

Temperature	25°C	Humidity	65%
Test Engineer	Wei Chen	Configurations	Channel 1

Frequency	20dB BW (kHz)	99% OBW (kHz)	Frequency range (MHz) at 20dB BW $f_L > 13.553\text{MHz}$	Frequency range (MHz) at 20dB BW $f_H < 13.567\text{MHz}$	Test Result
13.56 MHz	2.84	2.61	13.55855	13.56139	Complies

20 dB/99% Bandwidth Plot on 13.56 MHz



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4.4. Radiated Emissions Measurement

4.4.1. 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)

Frequencies (MHz)	Field Strength (micorvolts/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

4.4.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of receiver.

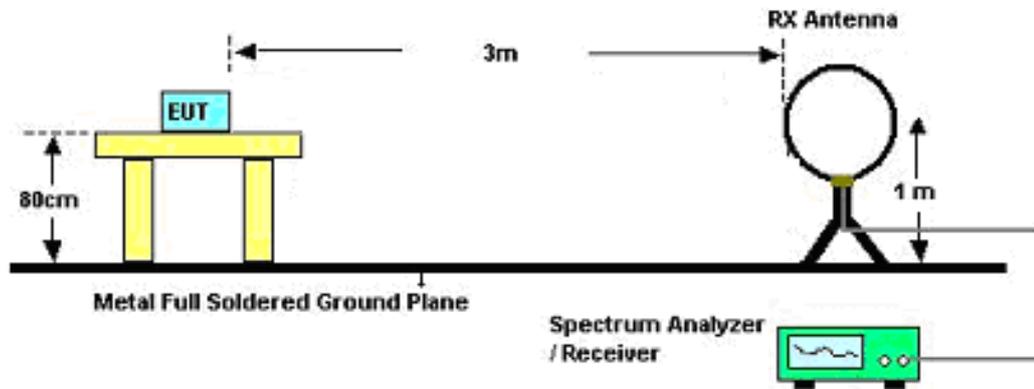
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.4.3. Test Procedures

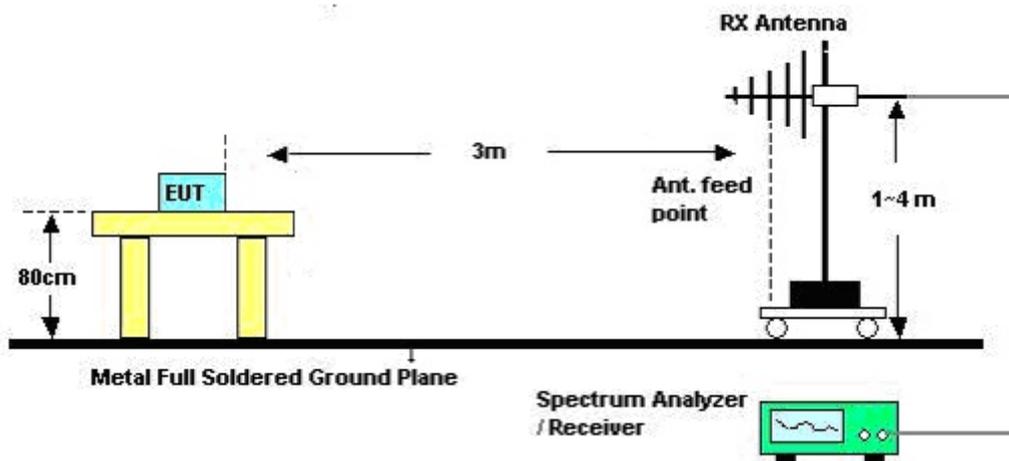
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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.

4.4.4. Test Setup Layout

For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



4.4.5. Test Deviation

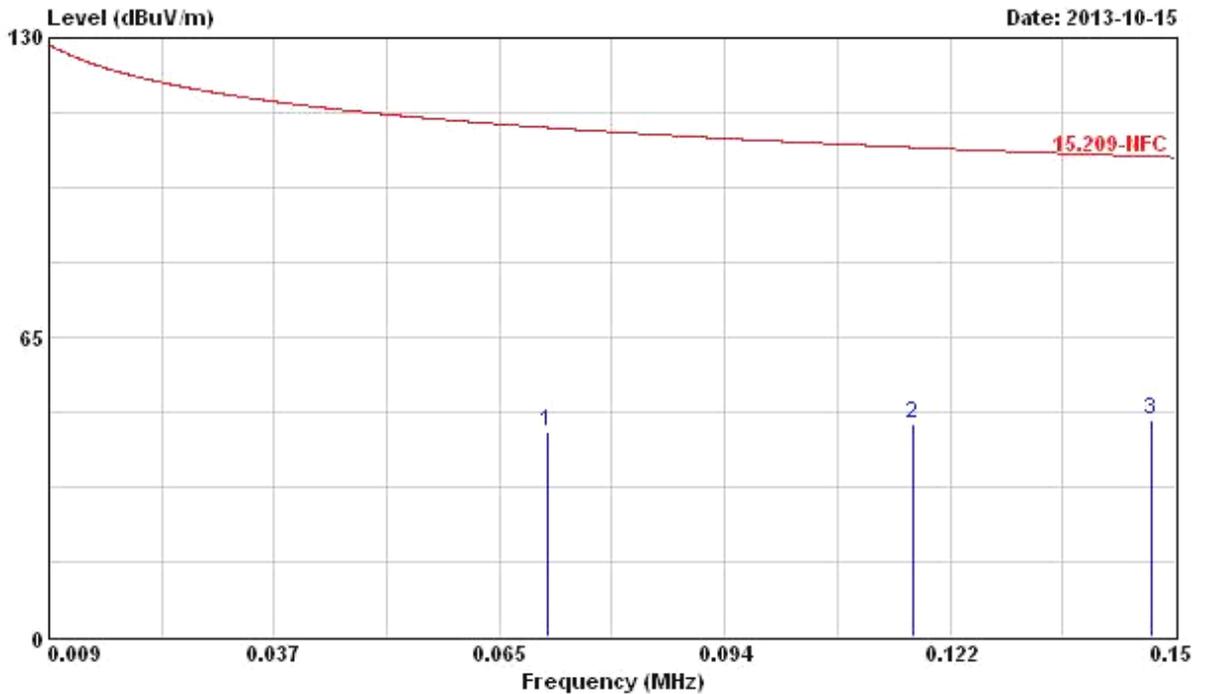
There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	23.9°C	Humidity	54%
Test Engineer	Daniel Hsu	Configurations	Channel 1
Frequency Range	9kHz ~ 150kHz		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	0.0713220	44.67	-65.87	110.54	24.42	20.20	0.05	0.00	Peak	---	---
2	0.1171470	46.00	-60.23	106.23	25.80	20.15	0.05	0.00	Peak	---	---
3	0.1470390	46.83	-57.43	104.26	26.58	20.20	0.05	0.00	Peak	---	---

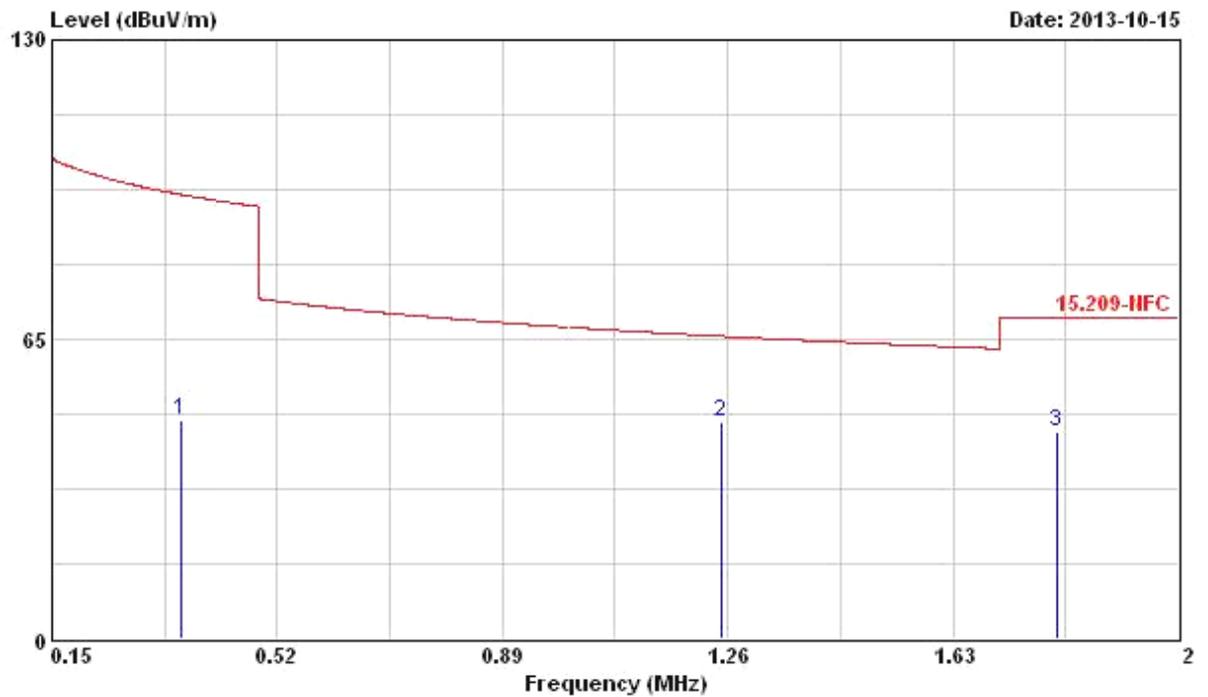
Note:

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 (specific distance / test distance) (dB);

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

Temperature	23.9°C	Humidity	54%
Test Engineer	Daniel Hsu	Configurations	Channel 1
Frequency Range	150kHz ~ 2MHz		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	0.3609000	47.47	-48.99	96.46	27.32	20.10	0.05	0.00	Peak	---	---
2	1.250	46.83	-18.84	65.67	26.78	19.95	0.10	0.00	Peak	---	---
3	1.800	44.79	-24.75	69.54	24.63	20.00	0.16	0.00	Peak	---	---

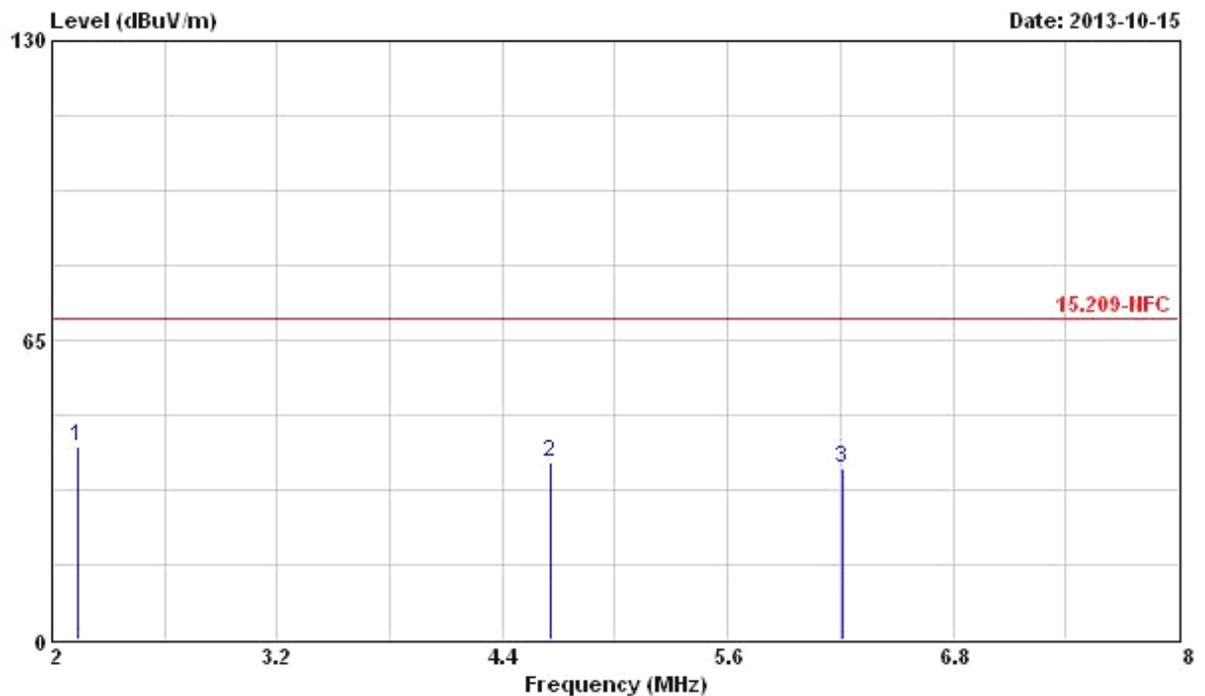
Note:

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.

Temperature	23.9°C	Humidity	54%
Test Engineer	Daniel Hsu	Configurations	Channel 1
Frequency Range	2MHz ~ 8MHz		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	2.140	41.89	-27.65	69.54	21.73	20.00	0.16	0.00	Peak	---	---
2	4.660	38.55	-30.99	69.54	18.29	20.04	0.22	0.00	Peak	---	---
3	6.210	37.17	-32.37	69.54	16.81	20.08	0.28	0.00	Peak	---	---

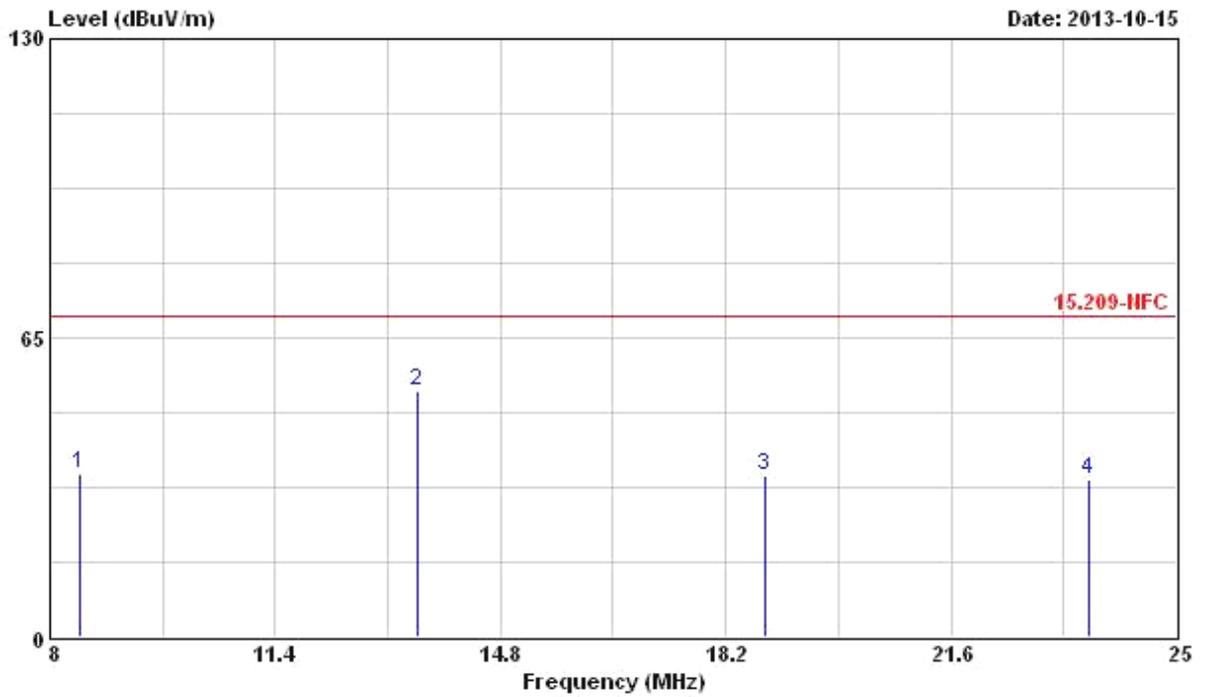
Note:

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.

Temperature	23.9°C	Humidity	54%
Test Engineer	Daniel Hsu	Configurations	Channel 1
Frequency Range	8MHz ~ 25MHz		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	8.460	35.66	-33.88	69.54	15.23	20.10	0.33	0.00	Peak	---	---
2 @	13.540	53.33	-16.21	69.54	32.75	20.10	0.48	0.00	Peak	---	---
3 @	18.780	34.92	-34.62	69.54	14.16	20.18	0.58	0.00	Peak	---	---
4	23.670	34.40	-35.14	69.54	13.61	20.13	0.66	0.00	Peak	---	---

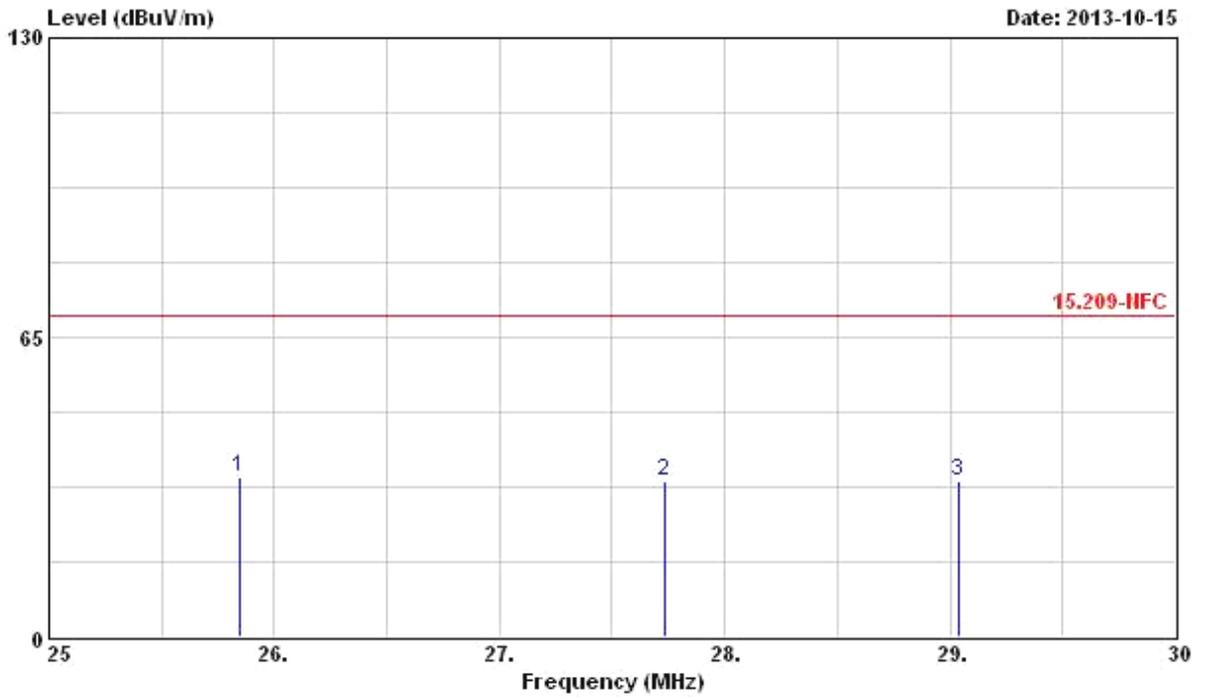
Note:

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 (specific distance / test distance) (dB);

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

Temperature	23.9°C	Humidity	54%
Test Engineer	Daniel Hsu	Configurations	Channel 1
Frequency Range	25MHz ~ 30MHz		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	25.850	34.46	-35.08	69.54	13.66	20.10	0.70	0.00	Peak	---	---
2	27.730	33.66	-35.88	69.54	12.84	20.10	0.72	0.00	Peak	---	---
3	29.040	33.92	-35.62	69.54	13.06	20.10	0.76	0.00	Peak	---	---

Note:

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

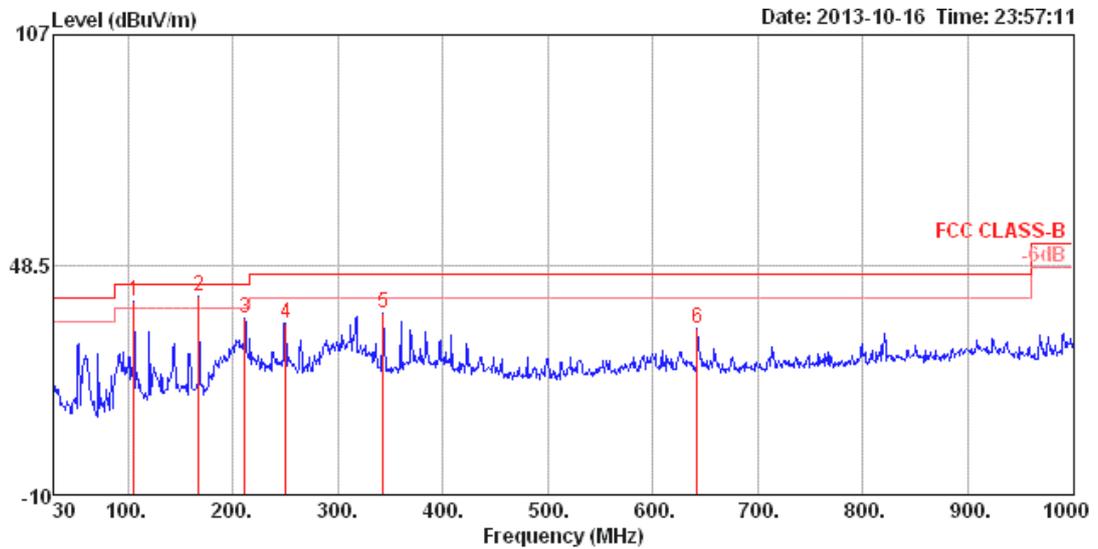
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

4.4.8. Results for Radiated Emissions (30MHz~1GHz)

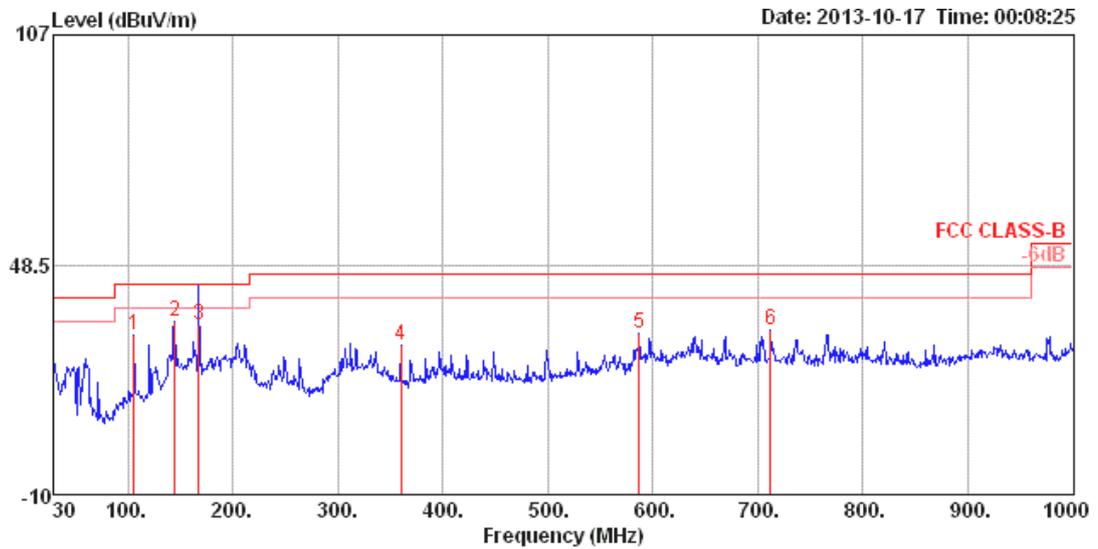
Temperature	25°C	Humidity	40%
Test Engineer	YC Chen	Configurations	Mode 1 / CTX

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	105.66	39.42	43.50	-4.08	58.74	1.22	11.03	31.57	300	276	HORIZONTAL Peak
2	167.74	40.35	43.50	-3.15	61.06	1.57	9.25	31.53	200	309	HORIZONTAL Peak
3	211.39	34.91	43.50	-8.59	56.11	1.78	8.44	31.42	200	131	HORIZONTAL Peak
4	250.19	33.63	46.00	-12.37	51.31	1.90	11.91	31.49	200	155	HORIZONTAL Peak
5	343.31	36.21	46.00	-9.79	51.20	2.30	14.06	31.35	100	53	HORIZONTAL Peak
6	642.07	32.12	46.00	-13.88	41.68	3.21	18.68	31.45	100	152	HORIZONTAL Peak

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	105.66	30.57	43.50	-12.93	49.89	1.22	11.03	31.57	100	230	VERTICAL Peak
2	144.46	34.07	43.50	-9.43	53.67	1.43	10.51	31.54	100	131	VERTICAL Peak
3	167.74	33.16	43.50	-10.34	53.87	1.57	9.25	31.53	100	167	VERTICAL QP
4	359.80	28.11	46.00	-17.89	42.43	2.35	14.66	31.33	100	198	VERTICAL Peak
5	586.78	30.96	46.00	-15.04	40.75	3.07	18.34	31.20	100	135	VERTICAL Peak
6	711.91	31.89	46.00	-14.11	40.59	3.43	19.14	31.27	100	185	VERTICAL 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.

4.5. Frequency Stability Measurement

4.5.1. 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.

4.5.2. Measuring Instruments and Setting

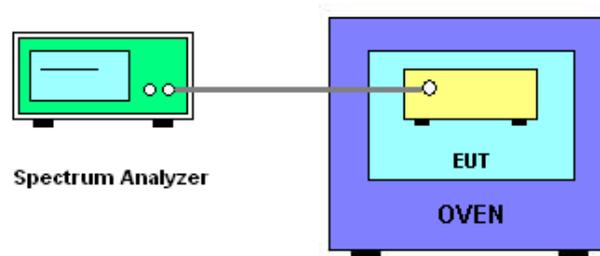
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RBW	1 kHz
VBW	1 kHz
Sweep Time	Auto

4.5.3. 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. fc 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 ± 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 is -20°C~50°C.

4.5.4. Test Setup Layout



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

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

4.5.7. Test Result of Frequency Stability

Temperature	25°C	Humidity	65%
Test Engineer	Wei Chen	Configurations	Channel 1
Test Date	Oct. 15, 2013		

Condition			Frequency (MHz)	Frequency Error (ppm)
Extreme	Modulation Mode	Test Frequency	10 min	10 min
T _{20°C} V _{max}	CW	13.56 MHz	13.56000	0.00
T _{20°C} V _{min}	CW	13.56 MHz	13.56000	0.00
T _{50°C} V _{nom}	CW	13.56 MHz	13.55970	-22.12
T _{40°C} V _{nom}	CW	13.56 MHz	13.55970	-22.12
T _{30°C} V _{nom}	CW	13.56 MHz	13.56000	0.00
T _{20°C} V _{nom}	CW	13.56 MHz	13.56000	0.00
T _{10°C} V _{nom}	CW	13.56 MHz	13.56000	0.00
T _{0°C} V _{nom}	CW	13.56 MHz	13.56030	22.12
T _{-10°C} V _{nom}	CW	13.56 MHz	13.56030	22.12
T _{-20°C} V _{nom}	CW	13.56 MHz	13.56030	22.12
Limit			Max. Deviation Limit < 100 ppm	

4.6. Antenna Requirements

4.6.1. 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.

4.6.2. Antenna Connector Construction

Please refer to section 3.1 in this test report, antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Oct. 23, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 26, 2012	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Jul. 17, 2013	Conduction (CO01-CB)
Impulsbegrenzer Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz~30MHz	Feb. 21, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 04, 2012	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	-	Conduction (CO01-CB)
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	Oct 03, 2013	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 11, 2013	Radiation (03CH02-HY)
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz - 30 MHz	Dec. 02, 2012*	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11146	100kHz ~ 1.3GHz	Jul 17, 2013	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 10, 2012	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	Oct. 22, 2012	Radiation (03CH02-HY)
Turn Table	Chaintek Instruments	3000	MF7802058	0~ 360 degree	N.C.R	Radiation (03CH02-HY)
Antenna Mast	MF	MF7802	MF780208205	1 ~ 4 m	N.C.R	Radiation (03CH02-HY)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Apr. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9kHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 12, 2013	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP 40	100305	9KHz~40GHz	Mar. 20, 2013	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100°C	Nov. 21, 2012	Conducted (TH01-HY)

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

“*” Calibration Interval of instruments listed above is two years.

NCR means Non-Calibration required.

6. 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 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

7. MEASUREMENT UNCERTAINTY

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz) – CO01-CB

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.026	dB	normal(k=2)	0.013
Cable loss	0.002	dB	normal(k=2)	0.001
AMN/LISN specification	1.200	dB	normal(k=2)	0.600
Mismatch Receiver VSWR 1= AMN/LISN VSWR 2=	-0.080	dB	U-shaped	0.060
Combined standard uncertainty $U_c(y)$				1.2
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				2.4

Uncertainty of Radiated Emission Measurement (30MHz ~ 1,000MHz) – 03CH01-CB

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	± 0.173	dB	K=1	0.086
Cable loss	± 0.174	dB	K=2	0.087
Antenna gain	± 0.169	dB	K=2	0.084
Site imperfection	± 0.433	dB	Triangular	0.214
Pre-amplifier gain	± 0.366	dB	K=2	0.183
Transmitter antenna	± 1.200	dB	Rectangular	0.600
Signal generator	± 0.461	dB	Rectangular	0.231
Mismatch	± 0.080	dB	U-shape	0.040
Spectrum analyzer	± 0.500	dB	Rectangular	0.250
Combined standard uncertainty $U_c(y)$				1.778
Measuring uncertainty for a level of confidence of 95% $U=2U_c(y)$				3.555

Uncertainty of Radiated Emission Measurement (9KHz ~ 30MHz) – 03CH02-HY and Conducted Emission Measurement – TH01-HY

Test Item		Uncertainty	Limit
Emission bandwidth		±1.42 %	N/A
Unwanted emissions, conducted	9 – 150 kHz	±0.38 dB	N/A
	0.15 – 30 MHz	±0.42 dB	N/A
	30 – 1000 MHz	±0.51 dB	N/A
All emissions, radiated	9 – 150 kHz	±2.49 dB	N/A
	0.15 – 30 MHz	±2.28 dB	N/A
	30 – 1000 MHz	±2.56 dB	N/A
Temperature		±0.8 °C	N/A
Humidity		±3 %	N/A
DC and low frequency voltages		±3 %	N/A
Time		±1.42 %	N/A
Duty Cycle		±1.42 %	N/A