

# FCC RF Test Report

**APPLICANT** : BungBungame Technology Co., Ltd.  
**EQUIPMENT** : BungBungame Tablet  
**BRAND NAME** : BungBungame  
**MODEL NAME** : KALOS 2  
**FCC ID** : 2ADNC-KA2TB115  
**STANDARD** : FCC Part 15 Subpart C §15.225  
**CLASSIFICATION** : (DXX) Low Power Communication Device Transmitter

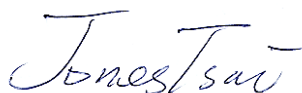
The testing was completed on Dec. 08, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



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Reviewed by: Joseph Lin / Supervisor



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Approved by: Jones Tsai / Manager



**SPORTON INTERNATIONAL INC.**

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



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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR5O1213D	Rev. 01	Initial issue of report	Jan. 29, 2016



## SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	FCC Rule	Description of Test	Result	Under Limit
3.1	15.207	AC Power Line Conducted Emissions	Complies	5.70 dB at 0.510 MHz
3.2	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	66.72 dB at 13.560 MHz
3.3	2.1049	20dB Spectrum Bandwidth	Complies	-
3.3	-	99% OBW Spectrum Bandwidth	Complies	-
3.4	15.225(d) 15.209	Radiated Emissions	Complies	3.49 dB at 40.530 MHz
3.5	15.225(e)	Frequency Stability	Complies	-
3.6	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.26dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±4.80dB	Confidence levels of 95%



## **1. GENERAL INFORMATION**

### **1.1 Applicant**

**BungBungame Technology Co., Ltd.**

15F., No.19-11, Sanchong Rd., Nangang Dist., Taipei City 11501, Taiwan (R.O.C)

### **1.2 Manufacturer**

**Inventec Appliances(Jiangning) Corporation**

133, Jiang-Jun Road, Jiangning District, Nanjing

### **1.3 Product Details**

Items	Description
<b>Tx/Rx Frequency Range</b>	13.553 ~ 13.567MHz
<b>Channel Number</b>	1
<b>20dBW</b>	2.64 KHz
<b>99%OBW</b>	2.24 KHz
<b>Antenna Type</b>	FPC coil
<b>Type of Modulation</b>	ASK

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

### **1.4 Modification of EUT**

No modifications are made to the EUT during all test items.

## 1.5 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

<b>Test Site</b>	SPORTON INTERNATIONAL INC.		
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		
	TH03-HY	CO05-HY	03CH07-HY
<b>Test Engineer</b>	22~24	20~21	21~23
<b>Temperature</b>	53~55	53~55	46~49
<b>Relative Humidity</b>	Danny Chen	Derreck Chen	James Chiu

**Note:** The test site complies with ANSI C63.4 2014 requirement.

## 1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.225
- ♦ ANSI C63.10-2013

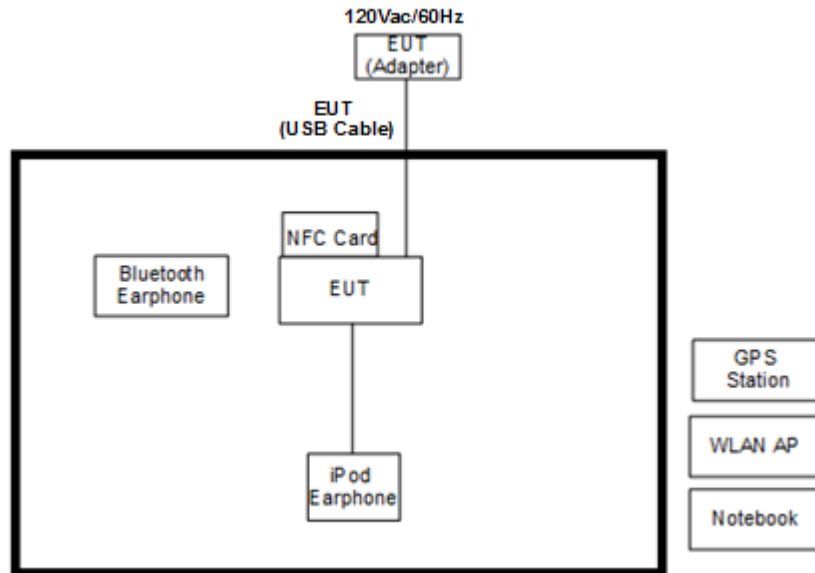
## 1.7 Test Modes

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.

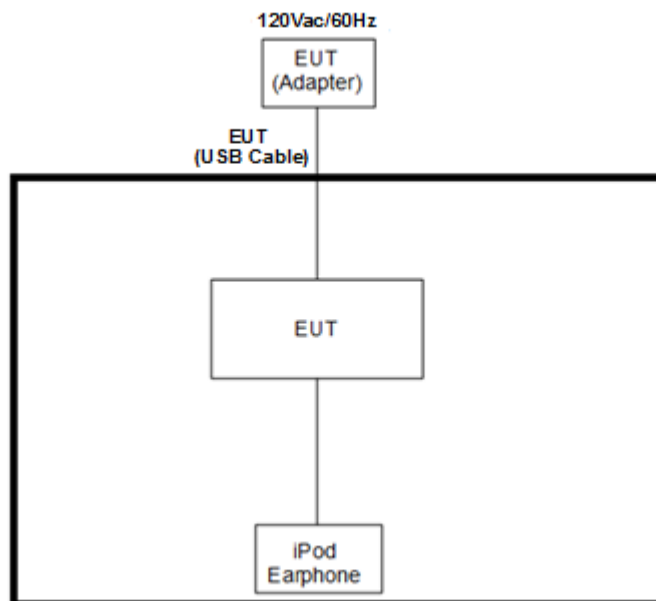
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz
<b>Note:</b> 1. The EUT was programmed to be in continuously transmitting mode. 2. The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 3 cm gap to the EUT.	

## 1.8 Test Configurations

### <AC Conducted Emissions>



### <For Fundamental Emissions and Mask and Radiated Emissions Measurement>



## 1.9 Table for Supporting Units

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
6.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
7.	NFC Card	Metro Taipei	Easy Card	N/A	N/A	N/A

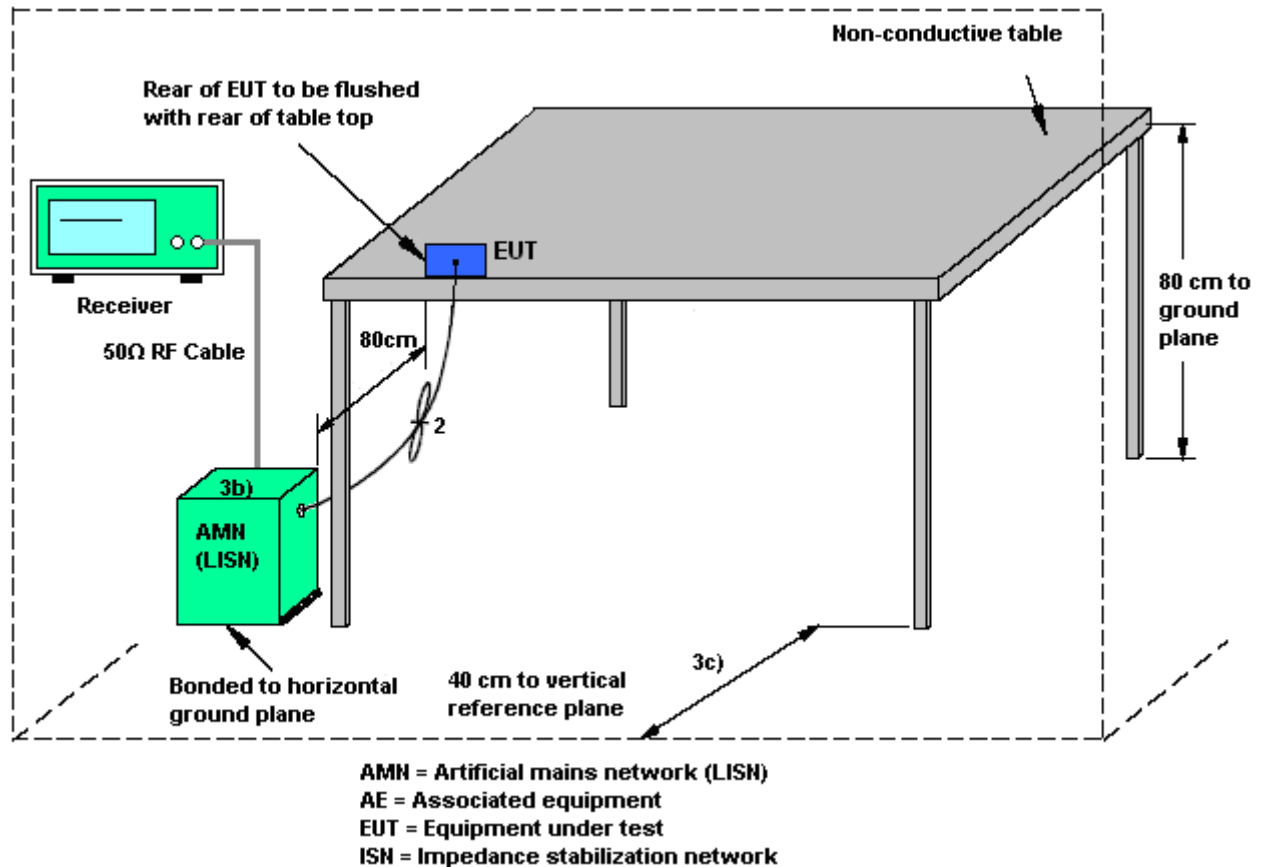


## 2. CONDUCTED EMISSION TEST

### 2.1 Measuring Instruments

See list of measuring instruments of this test report.

### 2.2 Test setup



### 2.3 Test Result of Conducted Emission Test

Please refer to Appendix B.

## 2.4 AC Power Line Conducted Emissions Measurement

### 2.4.1 Limit

For equipment that is designed to be connected to the public utility (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 the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### 2.4.2 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

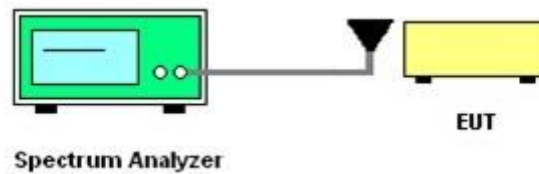
### 3. CONDUCTED TEST ITEMS

#### 3.1 Measuring Instruments

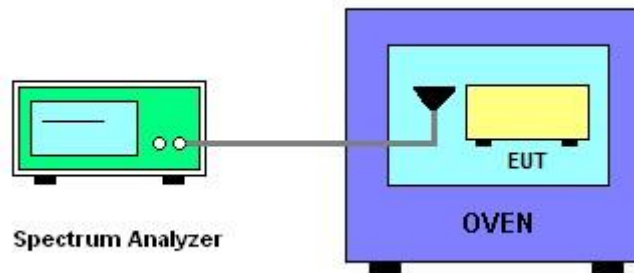
See list of measuring instruments of this test report.

#### 3.2 Test Setup

##### 3.2.1 20dB and 99% OBW Spectrum Bandwidth



##### 3.2.2 Frequency Stability



#### 3.3 Test Result of Conducted Test Items

Please refer to Appendix C.



### **3.4 20dB and 99% OBW Spectrum Bandwidth Measurement**

#### **3.4.1 Limit**

Intentional radiators must be designed to ensure that the 20dB and 99% emission bandwidth in the specific band 13.553~13.567MHz.

#### **3.4.2 Test Procedures**

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Measured the 99% OBW.

### **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 Test Procedures**

1. The spectrum analyzer connected via a receive antenna placed near the EUT.
2. EUT have transmitted signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and maxhold settings.
5. The 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  $\pm 100$ ppm.
6. Extreme temperature rule is -20°C~50°C.

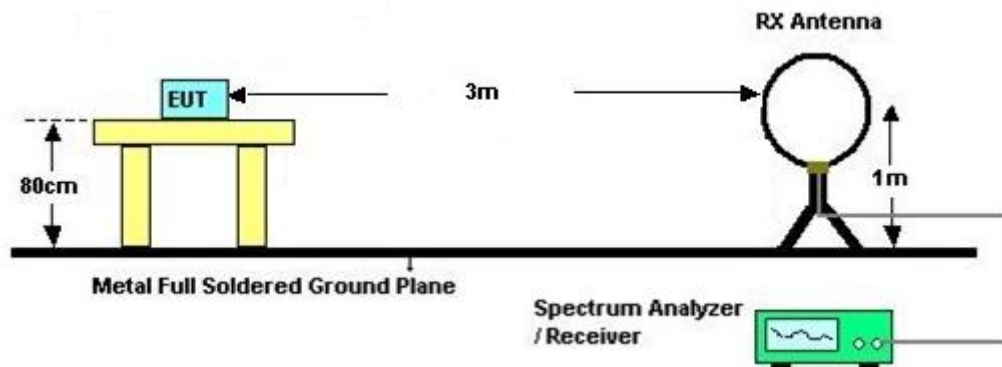
## 4. RADIATED TEST ITEMS

### 4.1 Measuring Instruments

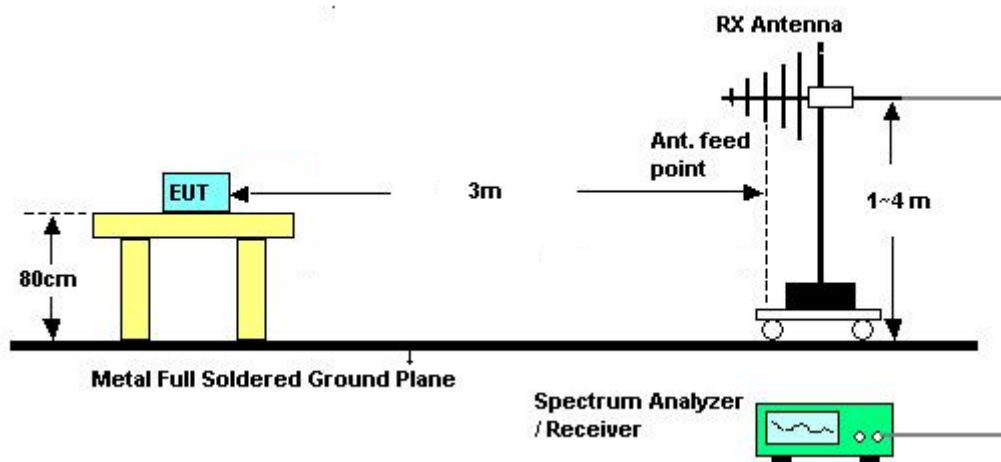
See list of measuring instruments of this test report.

### 4.2 Test Setup

#### 4.2.1 For radiated emissions below 30MHz



#### 4.2.2 For radiated emissions above 30MHz



### 4.3 Test Result of Radiated Test Items

Please refer to Appendix D.

## 4.4 Field Strength of Fundamental Emissions and Mask Measurement

### 4.4.1 Limit

Rules and specifications	FCC CFR 47 Part 15 section 15.225			
	IC RSS-210 A2.6			
Description	Compliance with the spectrum mask is tested with RBW set to 9kHz.			
Freq. of Emission (MHz)	Field Strength ( $\mu$ V/m) at 30m	Field Strength (dB $\mu$ V/m) at 30m	Field Strength (dB $\mu$ V/m) at 10m	Field Strength (dB $\mu$ V/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

### 4.4.2 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 with RBW set to 9kHz.

Note: Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m).

## 4.5 Radiated Emissions Measurement

### 4.5.1 Limit

The field strength of any emissions which appear outside of 13.110 ~14.010MHz band shall not exceed the general radiated emissions limits.

Frequencies (MHz)	Field Strength ( $\mu\text{V/m}$ )	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

### 4.5.2 Measuring Instrument Setting

The following table is the setting of receiver.

Receiver Parameter	Setting
Attenuation	Auto
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

**Note:** The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

#### **4.5.3 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. Antenna Requirements

#### **4.5.4 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.

#### **4.5.5 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.





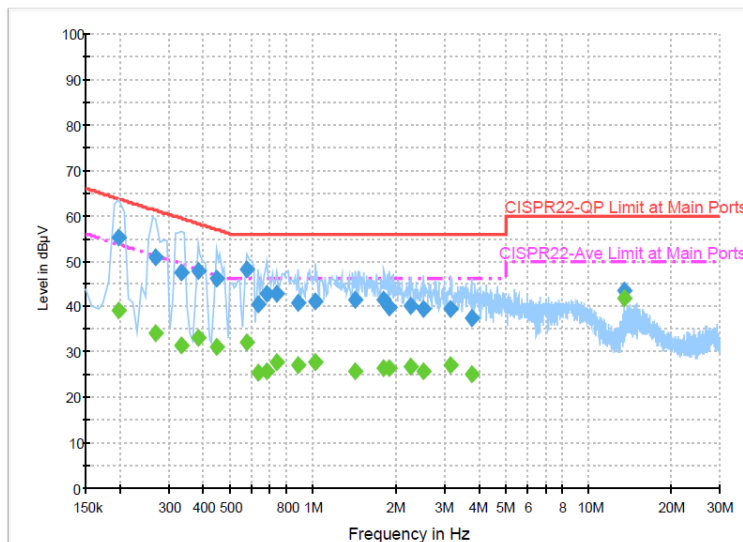
## 5. LIST OF MEASURING EQUIPMENT

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Rohde & Schwarz	FSP30	101329	9kHz~30GHz	Jun. 24, 2015	Nov. 23, 2015	Jun. 23, 2016	Conducted (TH03-HY)
Temperature Chamber	ESPEC	SU-641	92013721	-30°C~70°C	Nov. 20, 2015	Nov. 23, 2015	Nov. 19, 2016	Conducted (TH03-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz – 2.75GHz	Dec. 03, 2015	Dec. 08, 2015	Dec. 02, 2016	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 02, 2015	Dec. 08, 2015	Dec. 01, 2016	Conduction (CO05-HY)
Bilog Antenna	Schaffner	CBL6112D	35379	30MHz ~ 1GHz	Oct. 15, 2015	Dec. 01, 2015	Oct. 16, 2016	Radiation (03CH07-HY)
Loop Antenna	TESEQ	HLA6120	31244	9 kHz~30 MHz	Fed. 02 ,2015	Dec. 01, 2015	Fed. 01, 2016	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1000MHz	Mar. 12, 2015	Dec. 01, 2015	Mar. 11, 2016	Radiation (03CH07-HY)
Signal Analyzer	Rohde & Schwarz	FSV 30	101749	10Hz~30GHz	Mar. 10, 2015	Dec. 01, 2015	Mar. 09, 2016	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Dec. 01, 2015	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 degree	N/A	Dec. 01, 2015	N/A	Radiation (03CH07-HY)



## Appendix B. Test Results of Conducted Emission Test

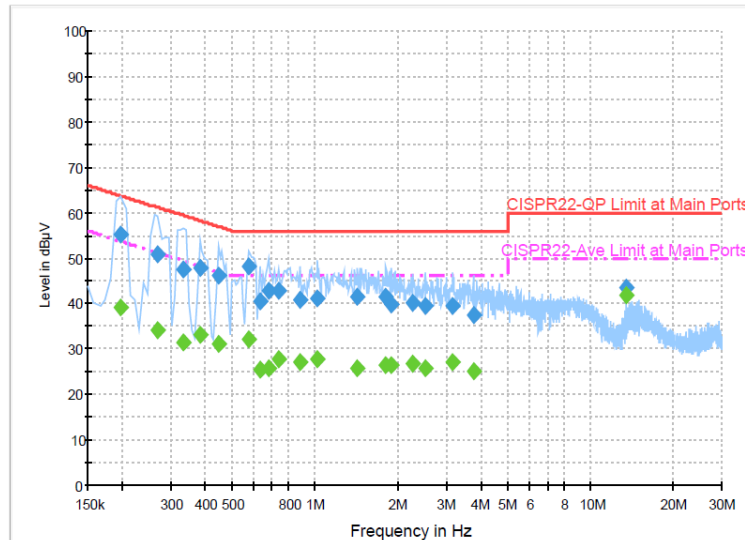
Test Mode :	NFC Tx	Test Voltage :	120Vac / 60Hz
Function Type :	Bluetooth Link + WLAN Link + Earphone + NFC Link + USB Cable (Charging from Adapter) + GPS Rx		



### Final Result : QuasiPeak

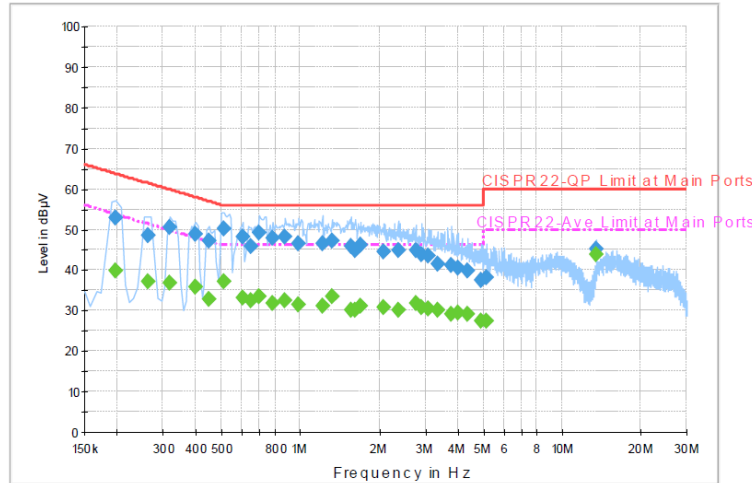
Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.198000	55.1	Off	L1	19.6	8.6	63.7
0.270000	50.7	Off	L1	19.6	10.4	61.1
0.334000	47.5	Off	L1	19.6	11.9	59.4
0.382000	47.7	Off	L1	19.6	10.5	58.2
0.446000	46.2	Off	L1	19.6	10.7	56.9
0.574000	48.1	Off	L1	19.6	7.9	56.0
0.630000	40.5	Off	L1	19.6	15.5	56.0
0.678000	42.9	Off	L1	19.6	13.1	56.0
0.742000	42.9	Off	L1	19.6	13.1	56.0
0.886000	40.8	Off	L1	19.6	15.2	56.0
1.022000	41.2	Off	L1	19.7	14.8	56.0
1.430000	41.5	Off	L1	19.6	14.5	56.0
1.814000	41.6	Off	L1	19.6	14.4	56.0
1.902000	39.8	Off	L1	19.6	16.2	56.0
2.278000	40.2	Off	L1	19.6	15.8	56.0
2.510000	39.4	Off	L1	19.6	16.6	56.0
3.174000	39.4	Off	L1	19.7	16.6	56.0
3.758000	37.4	Off	L1	19.6	18.6	56.0
13.558000	43.5	Off	L1	19.7	16.5	60.0

<b>Test Mode :</b>	NFC Tx	<b>Test Voltage :</b>	120Vac / 60Hz
<b>Function Type :</b>	Bluetooth Link + WLAN Link + Earphone + NFC Link + USB Cable (Charging from Adapter) + GPS Rx		


**Final Result : Average**

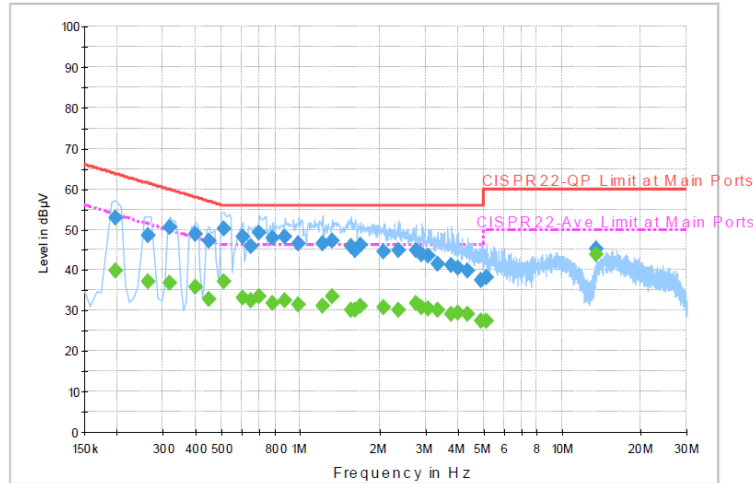
Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.198000	39.0	Off	L1	19.6	14.7	53.7
0.270000	34.3	Off	L1	19.6	16.8	51.1
0.334000	31.6	Off	L1	19.6	17.8	49.4
0.382000	33.1	Off	L1	19.6	15.1	48.2
0.446000	31.1	Off	L1	19.6	15.8	46.9
0.574000	32.2	Off	L1	19.6	13.8	46.0
0.630000	25.5	Off	L1	19.6	20.5	46.0
0.678000	25.8	Off	L1	19.6	20.2	46.0
0.742000	27.9	Off	L1	19.6	18.1	46.0
0.886000	27.0	Off	L1	19.6	19.0	46.0
1.022000	27.8	Off	L1	19.7	18.2	46.0
1.430000	25.8	Off	L1	19.6	20.2	46.0
1.814000	26.5	Off	L1	19.6	19.5	46.0
1.902000	26.4	Off	L1	19.6	19.6	46.0
2.278000	26.7	Off	L1	19.6	19.3	46.0
2.510000	25.6	Off	L1	19.6	20.4	46.0
3.174000	26.9	Off	L1	19.7	19.1	46.0
3.758000	25.1	Off	L1	19.6	20.9	46.0
13.558000	42.0	Off	L1	19.7	8.0	50.0

<b>Test Mode :</b>	NFC Tx	<b>Test Voltage :</b>	120Vac / 60Hz
<b>Function Type :</b>	Bluetooth Link + WLAN Link + Earphone + NFC Link + USB Cable (Charging from Adapter) + GPS Rx		


**Final Result : QuasiPeak**

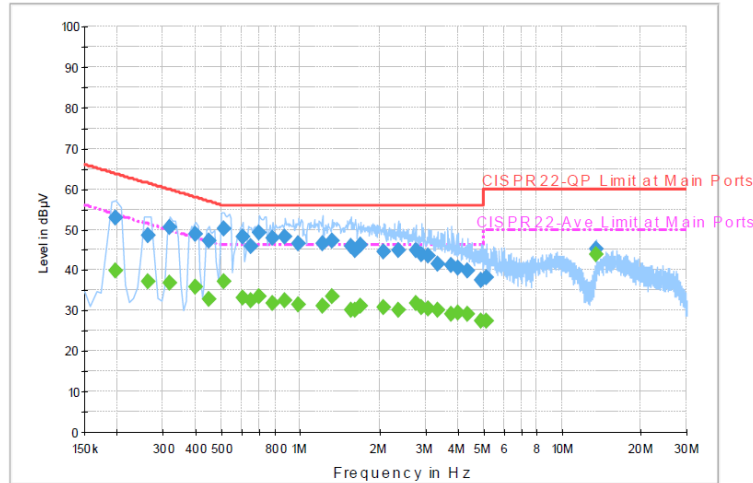
Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.198000	52.8	Off	N	19.6	10.9	63.7
0.262000	48.5	Off	N	19.6	12.9	61.4
0.318000	50.6	Off	N	19.6	9.2	59.8
0.398000	48.8	Off	N	19.6	9.1	57.9
0.446000	47.2	Off	N	19.6	9.7	56.9
0.510000	50.3	Off	N	19.6	5.7	56.0
0.606000	48.2	Off	N	19.6	7.8	56.0
0.646000	45.8	Off	N	19.6	10.2	56.0
0.694000	49.1	Off	N	19.6	6.9	56.0
0.782000	47.8	Off	N	19.5	8.2	56.0
0.878000	48.1	Off	N	19.6	7.9	56.0
0.990000	46.5	Off	N	19.6	9.5	56.0
1.214000	46.3	Off	N	19.5	9.7	56.0
1.318000	47.0	Off	N	19.6	9.0	56.0
1.558000	45.7	Off	N	19.6	10.3	56.0
1.622000	44.9	Off	N	19.6	11.1	56.0
1.702000	46.0	Off	N	19.6	10.0	56.0

<b>Test Mode :</b>	NFC Tx	<b>Test Voltage :</b>	120Vac / 60Hz
<b>Function Type :</b>	Bluetooth Link + WLAN Link + Earphone + NFC Link + USB Cable (Charging from Adapter) + GPS Rx		


**Final Result : QuasiPeak**

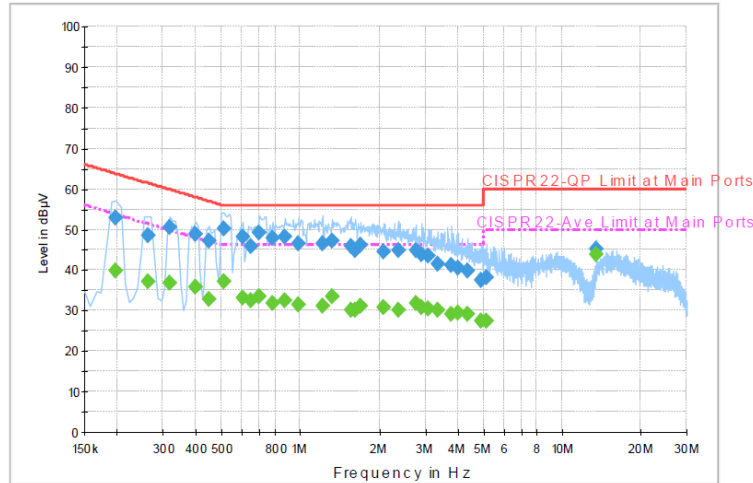
Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.094000	44.5	Off	N	19.6	11.5	56.0
2.366000	44.9	Off	N	19.6	11.1	56.0
2.758000	44.8	Off	N	19.6	11.2	56.0
2.902000	43.7	Off	N	19.6	12.3	56.0
3.102000	43.5	Off	N	19.6	12.5	56.0
3.342000	41.6	Off	N	19.6	14.4	56.0
3.782000	41.0	Off	N	19.6	15.0	56.0
4.006000	40.3	Off	N	19.6	15.7	56.0
4.350000	39.8	Off	N	19.6	16.2	56.0
4.918000	37.6	Off	N	19.7	18.4	56.0
5.158000	38.3	Off	N	19.7	21.7	60.0
13.558000	45.1	Off	N	19.8	14.9	60.0

<b>Test Mode :</b>	NFC Tx	<b>Test Voltage :</b>	120Vac / 60Hz
<b>Function Type :</b>	Bluetooth Link + WLAN Link + Earphone + NFC Link + USB Cable (Charging from Adapter) + GPS Rx		


**Final Result : Average**

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.198000	39.8	Off	N	19.6	13.9	53.7
0.262000	37.1	Off	N	19.6	14.3	51.4
0.318000	36.8	Off	N	19.6	13.0	49.8
0.398000	35.8	Off	N	19.6	12.1	47.9
0.446000	32.9	Off	N	19.6	14.0	46.9
0.510000	37.0	Off	N	19.6	9.0	46.0
0.606000	33.1	Off	N	19.6	12.9	46.0
0.646000	32.5	Off	N	19.6	13.5	46.0
0.694000	33.6	Off	N	19.6	12.4	46.0
0.782000	31.9	Off	N	19.5	14.1	46.0
0.878000	32.3	Off	N	19.6	13.7	46.0
0.990000	31.5	Off	N	19.6	14.5	46.0
1.214000	31.2	Off	N	19.5	14.8	46.0
1.318000	33.3	Off	N	19.6	12.7	46.0
1.558000	30.1	Off	N	19.6	15.9	46.0
1.622000	30.2	Off	N	19.6	15.8	46.0
1.702000	31.2	Off	N	19.6	14.8	46.0

<b>Test Mode :</b>	NFC Tx	<b>Test Voltage :</b>	120Vac / 60Hz
<b>Function Type :</b>	Bluetooth Link + WLAN Link + Earphone + NFC Link + USB Cable (Charging from Adapter) + GPS Rx		


**Final Result : Average**

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.094000	30.6	Off	N	19.6	15.4	46.0
2.366000	30.1	Off	N	19.6	15.9	46.0
2.758000	31.7	Off	N	19.6	14.3	46.0
2.902000	30.8	Off	N	19.6	15.2	46.0
3.102000	30.6	Off	N	19.6	15.4	46.0
3.342000	30.2	Off	N	19.6	15.8	46.0
3.782000	29.2	Off	N	19.6	16.8	46.0
4.006000	29.4	Off	N	19.6	16.6	46.0
4.350000	29.0	Off	N	19.6	17.0	46.0
4.918000	27.3	Off	N	19.7	18.7	46.0
5.158000	27.4	Off	N	19.7	22.6	50.0
13.558000	43.8	Off	N	19.8	6.2	50.0

(1) with antenna

Remark: 13.558MHz is the NFC RF fundamental signal.

(2) with dummy load

Remark: Only the fundamental NFC signal needs to be retested per C63.4.



## Appendix C. Test Results of Conducted Test Items

### C.1 Test Result of 20dB Spectrum Bandwidth

Test mode	NFC Tx	Test Frequency (MHz)	13.56
Date: 23.NOV.2015 09:50:45		Date: 23.NOV.2015 09:39:26	
20dB Bandwidth (kHz)	2.640	99% OccupiedBW(kHz)	2.240
Frequency range (MHz)	$f_L > 13.553$	13.55932	Test Result
	$f_H < 13.567$	13.56196	Complies



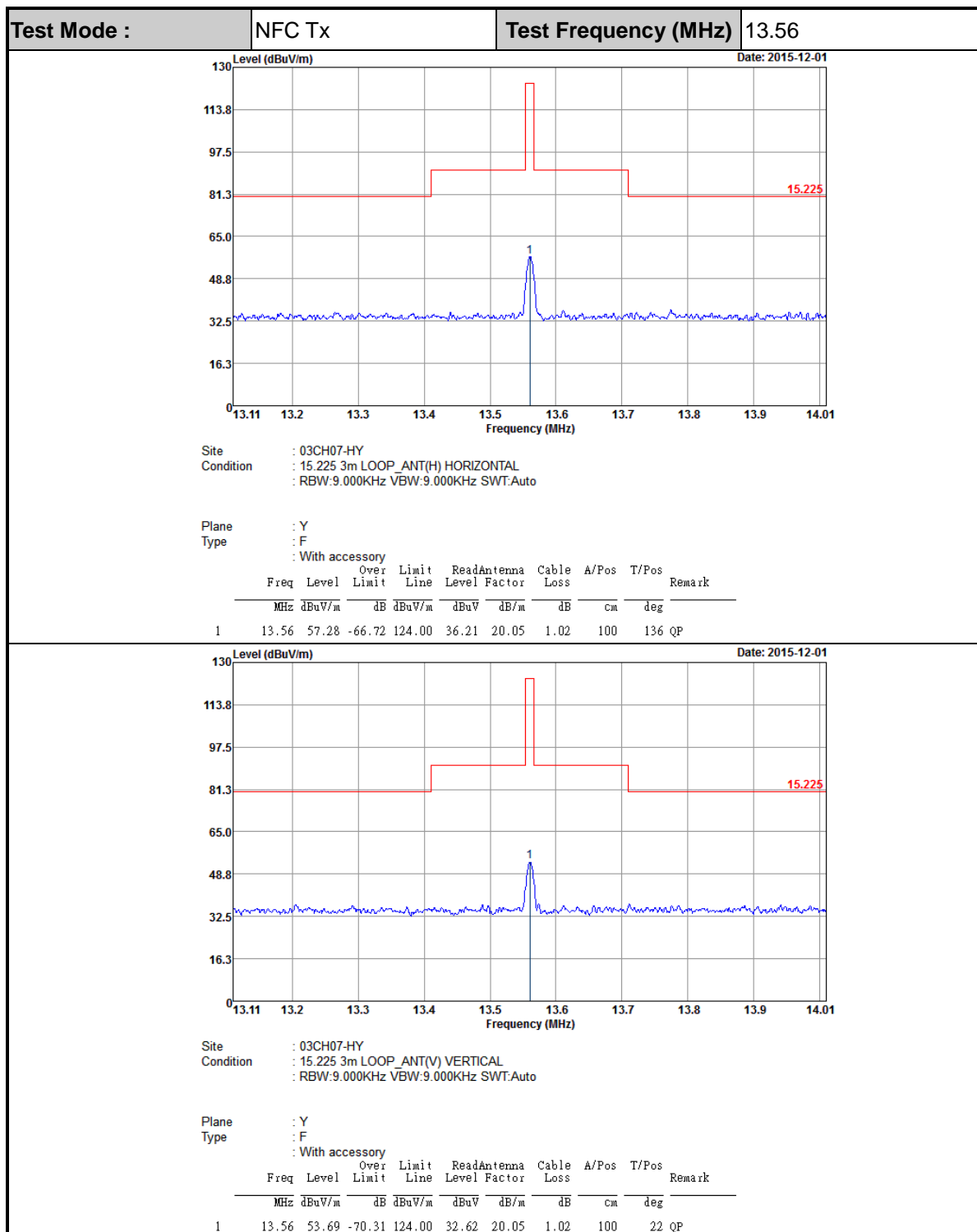
**C.2 Test Result of Frequency Stability**

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability	
Voltage (Vac)	Measurement Frequency (MHz)	Temperature (°C)	Measurement Frequency (MHz)
120	13.560640	-20	13.560800
102	13.560640	-10	13.560780
138	13.560640	0	13.560780
		10	13.560780
		20	13.560760
		30	13.560750
		40	13.560740
		50	13.560730
Max.Deviation (MHz)	0.000640	Max.Deviation (MHz)	0.000800
Max.Deviation (ppm)	47.1976	Max.Deviation (ppm)	58.9971
Limit	FS < ±100 ppm	Limit	FS < ±100 ppm
Test Result	PASS	Test Result	PASS



## Appendix D. Test Results of Radiated Test Items

### D.1 Test Result of Field Strength of Fundamental Emissions



**Note:** All NFC's spurious emissions are below 20dB of limits.

**D.2 Results of Radiated Emissions (9 kHz~30MHz)**

Test Mode :		NFC Tx			Polarization :		Horizontal		
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
0.01334	26.82	-98.28	125.1	5.55	21.27	1.02	-	-	Average
0.06618	37.01	-74.18	111.19	15.95	21.06	1.02	-	-	Average
0.09728	22.7	-85.14	107.84	1.69	21.01	1.02	-	-	QP
0.12968	28.62	-76.73	105.35	7.63	20.99	1.02	-	-	Average
0.4526	43.17	-51.32	94.49	22.25	20.92	1.02	-	-	Average
0.51253	38.99	-34.42	73.41	18.07	20.92	1.02	-	-	QP
11.688	36.66	-32.84	69.5	15.59	21.07	1.02	-	-	QP
13.56	57.27	-	-	36.2	21.07	1.02	-	-	QP
23.965	40.38	-29.12	69.5	18.04	22.34	1.77	-	-	QP
29.77	40.76	-28.74	69.5	18.65	22.11	1.77	100	0	QP

Test Mode :		NFC Tx			Polarization :		Vertical		
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
0.00982	26.48	-101.29	127.77	5.21	21.27	1.02	-	-	Average
0.0651	28.17	-83.16	111.33	7.11	21.06	1.02	-	-	Average
0.09876	21.5	-86.21	107.71	0.49	21.01	1.02	-	-	QP
0.12856	26.82	-78.6	105.42	5.83	20.99	1.02	-	-	Average
0.44818	40.95	-53.62	94.57	20.03	20.92	1.02	-	-	Average
1.804	40.66	-28.84	69.5	19.71	20.95	1.02	100	0	QP
11.272	37.5	-32	69.5	16.43	21.07	1.02	-	-	QP
13.56	52.88	-	-	31.81	21.07	1.02	-	-	QP
24.163	40.69	-28.81	69.5	18.35	22.34	1.77	-	-	QP
29.67	40.45	-29.05	69.5	18.32	22.13	1.77	-	-	QP

**Note:**

1. 13.56 MHz is fundamental signal which can be ignored.
2. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
4. Limit line = specific limits (dBμV) + distance extrapolation factor.

**D.3 Results of Radiated Emissions (30MHz~1GHz)**

<b>Test Mode :</b>		NFC Tx				<b>Polarization :</b>		Horizontal		
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
30.27	31.37	-8.63	40	41.2	-9.83	1.77	31.5	-	-	Peak
67.8	32.05	-7.95	40	54.53	-22.48	2.06	31.26	100	0	Peak
195.51	32.85	-10.65	43.5	51.08	-18.23	2.69	31.1	-	-	Peak
314.7	30.75	-15.25	46	44.14	-13.39	3.28	31	-	-	Peak
524.7	24.65	-21.35	46	33.07	-8.42	3.89	30.7	-	-	Peak
976.9	30.85	-23.15	54	33.79	-2.94	4.94	30.29	-	-	Peak

<b>Test Mode :</b>		NFC Tx				<b>Polarization :</b>		Vertical		
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
40.53	36.51	-3.49	40	52.3	-15.79	1.77	31.2	100	0	Peak
67.8	34.07	-5.93	40	56.55	-22.48	2.06	31.26	-	-	Peak
195.51	27.94	-15.56	43.5	46.17	-18.23	2.69	31.1	-	-	Peak
315.4	26.85	-19.15	46	40.24	-13.39	3.28	31	-	-	Peak
799.1	26.83	-19.17	46	31.52	-4.69	4.62	30.3	-	-	Peak
895	29.53	-16.47	46	33.23	-3.7	4.66	30.31	-	-	Peak

**Note:**

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.