Report No.SH17010030W09

FCC RF TEST REPORT

Issued to

Shanghai Sunmi Technology Co.,Ltd.

For

Smart POS system

Model Name	:	W6900
Trade Name	:	SUNMI
Brand Name	:	SUNMI
Standard	:	47 CFR Part 15,Subpart C ANSI C63.10-2013
FCC ID	:	2AH25P1
Test date	:	Feb.10,2017 to Feb.11,2017
Issue date	:	Feb.12,2017

by

Shanghai Skylabs Co., Ltd.

Tested by Wu Hongfei *Approved by* Gu Yenjing *Review by* Xiaodong Mei

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DIRECTORY

Change History

Issue	Date	Reason for change
1.0	Feb.12,2017	First edition

1. General Information

1.1 Applicant

Shanghai Sunmi Technology Co.,Ltd.
Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China

1.2 Manufacturer

Shanghai Sunmi Technology Co.,Ltd.
Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China

1.3 Description ofEUT

EUT Name.....:	Smart POS system
Model Name.....:	W6900
Brand Name.....:	SUNMI
Trade Name .....:	SUNMI
Hardware Version.....:	V1.1
Software Version .....:	B900_A1BOM_V1.1.4_20170103
Modulation Type .....:	ASK
Frequency Range.....:	13.56MHz
EUT Stage .....:	Production Unit
Antenna Type.....:	Spiral antenna
Antenna Gain.....:	-4 dBi

NOTE 1:
For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacture.

2. Facilities and Accreditations

2.1 Test Facility

Shanghai Skylabs Co., Ltd. Skylabs Laboratory is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6644. A 9*6*6(m) full/semi-anechoic chamber was used for the radiated emissions test.

2.2 Environmental Conditions

Ambient temperature: 15~35°C
Relative humidity: 30~60%
Atmosphere pressure: 86-106kPa

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.
Uncertainty of Conducted Emission: ±1.76dB
Uncertainty of Radiated Emission:±3.16dB

2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Cal.Date	Cal. Due
Spectrum Analyzer	R&S	FSU26	200880	2016.2.25	1year
Attenuator 1	Resnet	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 2	Resnet	3dB	(n.a.)	(n.a.)	(n.a.)
Full/Semi-Anechoie Chamber	CHENGYU	9.2×6.25×6.15m	SAR	2015.9.14	3year
EMI Test Receiver	R&S	ESCI7	100787	2016.2.25	1year
LISN	TESEQ	NNB 51	33285	2016.2.25	1year
Personal Computer	HP	(n.a.)	(n.a.)	(n.a.)	(n.a.)
Temperature Chamber	YinHe Experimental Equipment	HL4003T	(n.a.)	2015.9.22	1year
Test Antenna-Log	Schwarzbeck	VULB 9163	9163-561	2015.9.25	1year
Test Antenna-Loop	Schwarzbeck	FMZB 1519	1519-025	2016.2.24	2year
Test Antenna-Horn	Schwarzbeck	BBHA 9120D	9120D-1033	2015.7.25	1year

NOTE:
Equipments listed above have been calibrated and are in the period of validation.

3. Test Standards and Results

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

FCC Part 15 Subpart C §15.247
ANSI C63.10-2013

NOTE:
(1)All test items were verified and recorded according to the standards and without any deviationduring the test.
(2)This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart C

Test items and the results are as bellow:

No.	FCC Rules	Description	Result
1	15.225 (a) – (d)	Spectrum mask	Pass
2	15.215 (c)	20dB Bandwidth	Pass
3	15.225 (e)	Frequency tolerance	Pass
4	15.207 (a)	Conducted Emission	Pass
5	15.205 (a) 15.209 (a)	Radiated Emission	Pass

4. Test Result

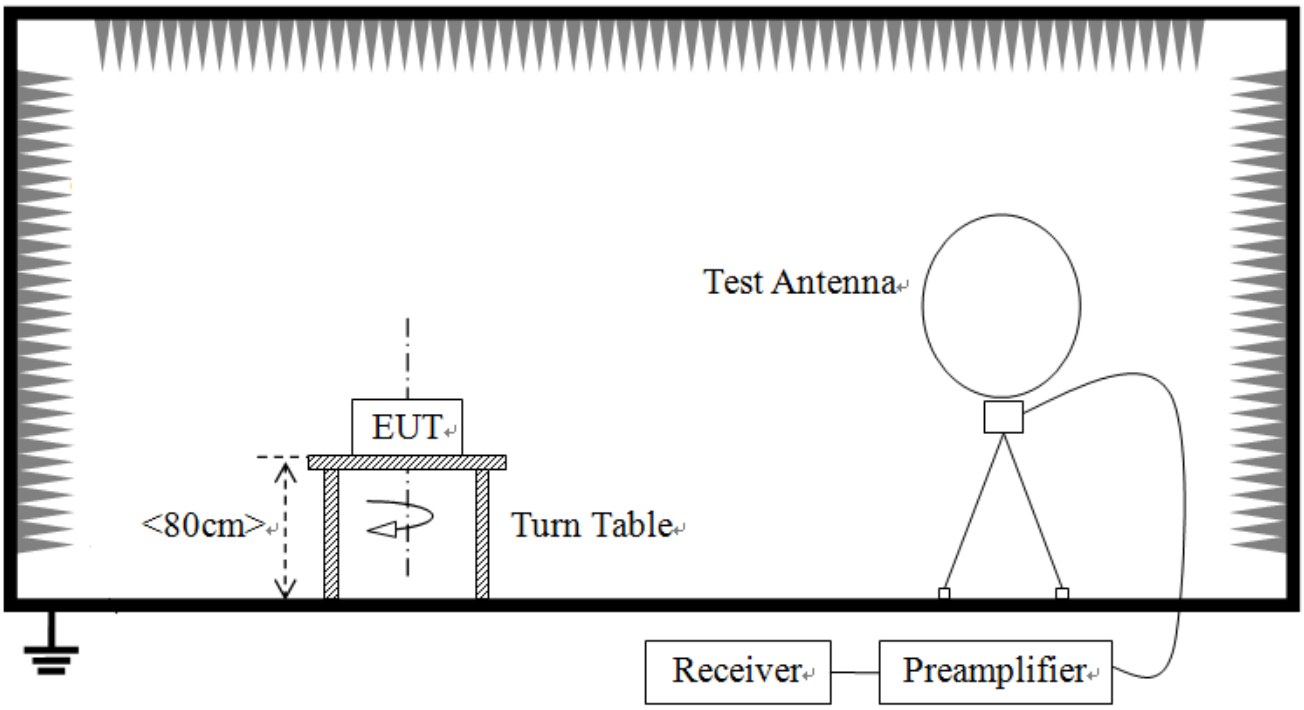
4.1 Spectrum mask

4.1.1 Requirement

According to FCC section 15.225(a)-(d),
(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

4.1.2 Test Description

A. Test Setup:



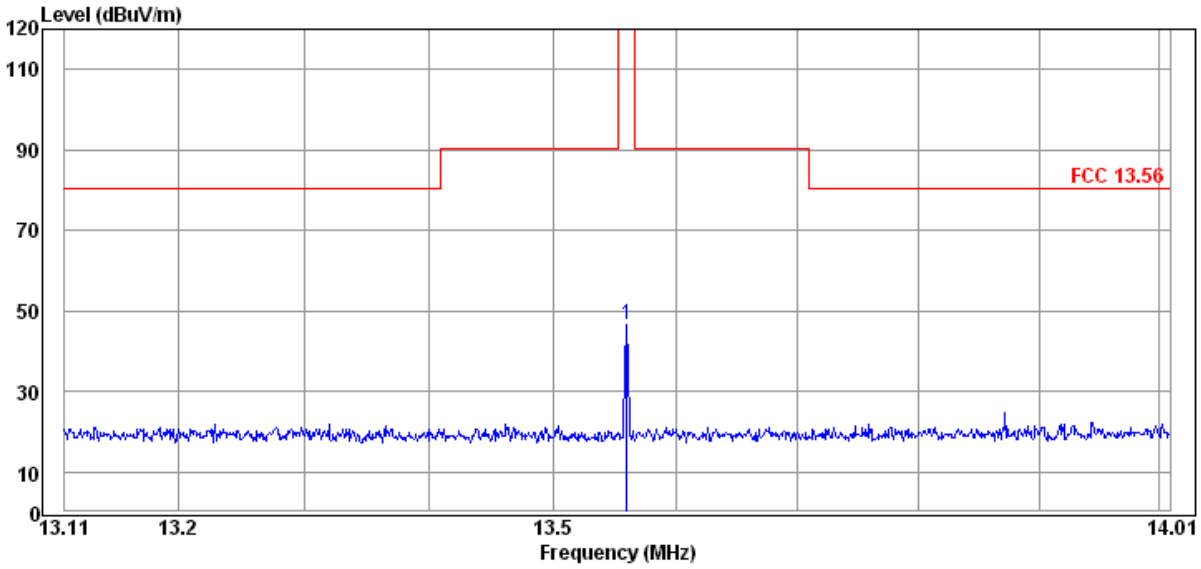
4.1.3 Test Result

A. Test Verdict:

Frequency (MHz)	Quasi-PeakLevel(dBμV/m) at3m	Limit (dBμV/m) at3m	Refer to plot	Verdict
13.56	46.5	124	Plot A	Pass

Note: The level at 30m was calculated using the dBμV/m measurement at 3m and extrapolating thisresult to produce a level at 30m. This value was then converted to obtain the value in μV/m.

B. Test Plots:



Plot A

4.2 20dB Bandwidth

4.2.1 Requirement

According to FCC section 15.215(c),for intentional radiators operating under the alternative provisions to the general emission limits the requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

4.2.2 Test Description

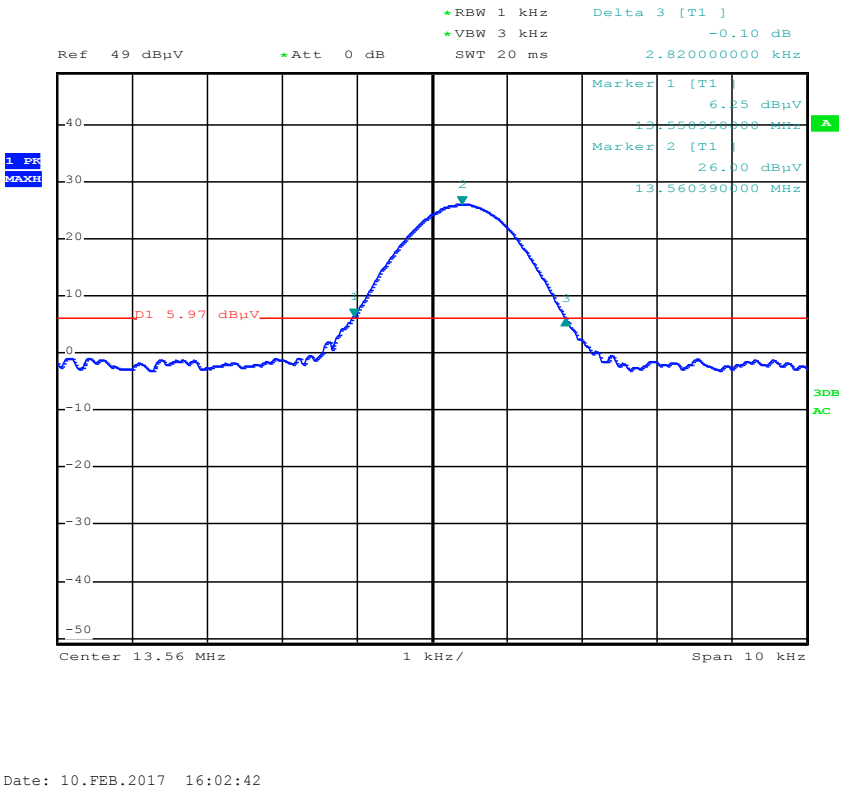
See section 4.1.2 of this report.

4.2.3 Test Result

A. Test Verdict:

Frequency (MHz)	20dB Bandwidth (kHz)	Refer to plot
13.56	2.82	Plot A

B. Test Plots:



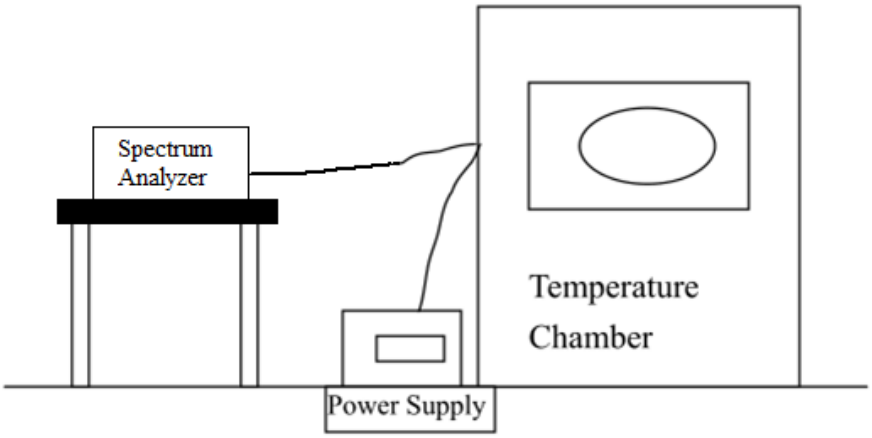
Plot A

4.3 Frequency tolerance

4.3.1 Requirement

According to FCC section 15.225 (e), the frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.3.2 Test Description



4.3.3 Test Result

Temperature (° C)	Supply Voltage (V)	Frequency (MHz)	Deviation (%)	Limit (%)	Result
50	3.7	13.56039	0	±0.01	Pass
40	3.7	13.56039	0	±0.01	Pass
30	3.7	13.56037	-0.00014	±0.01	Pass
20	3.3	13.56039	0	±0.01	Pass
	3.7	13.56039	0	±0.01	Pass
	4.2	13.56037	-0.00014	±0.01	Pass
10	3.7	13.56039	0	±0.01	Pass
0	3.7	13.56041	0.00014	±0.01	Pass
-10	3.7	13.56037	-0.00014	±0.01	Pass
-20	3.7	13.56039	0	±0.01	Pass

4.4 Conducted Emission

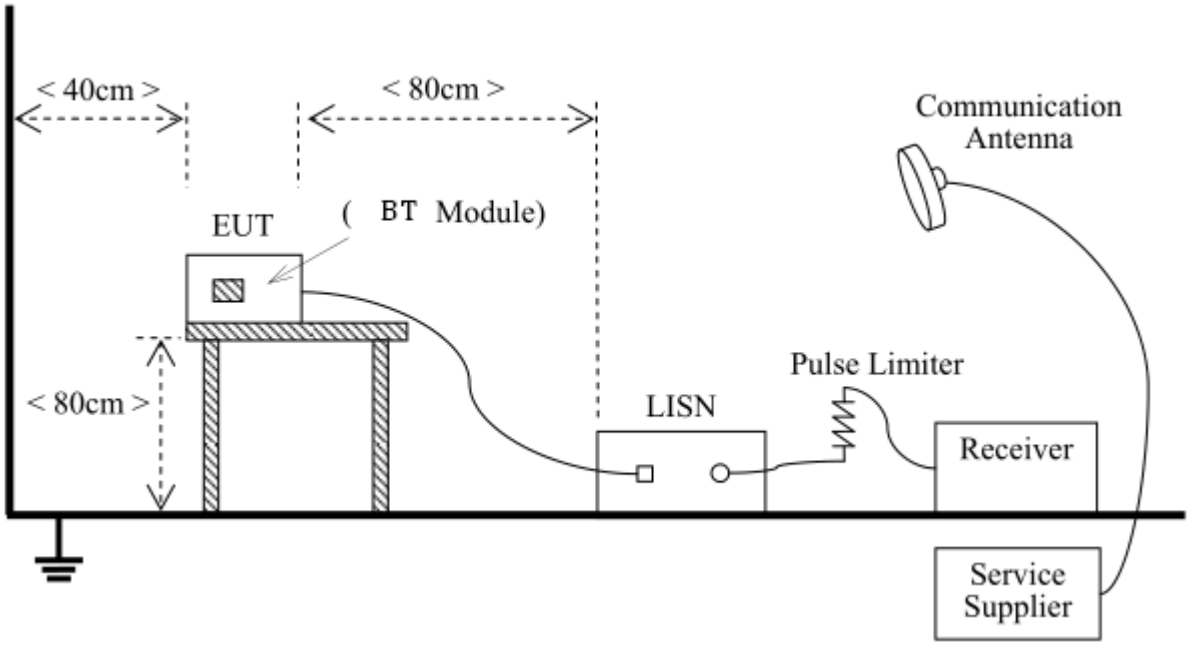
4.4.1 Requirement

According to FCC section 15.207, for an intentional radiator 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 within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network(LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:
(a) The lower limit shall apply at the band edges.
(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

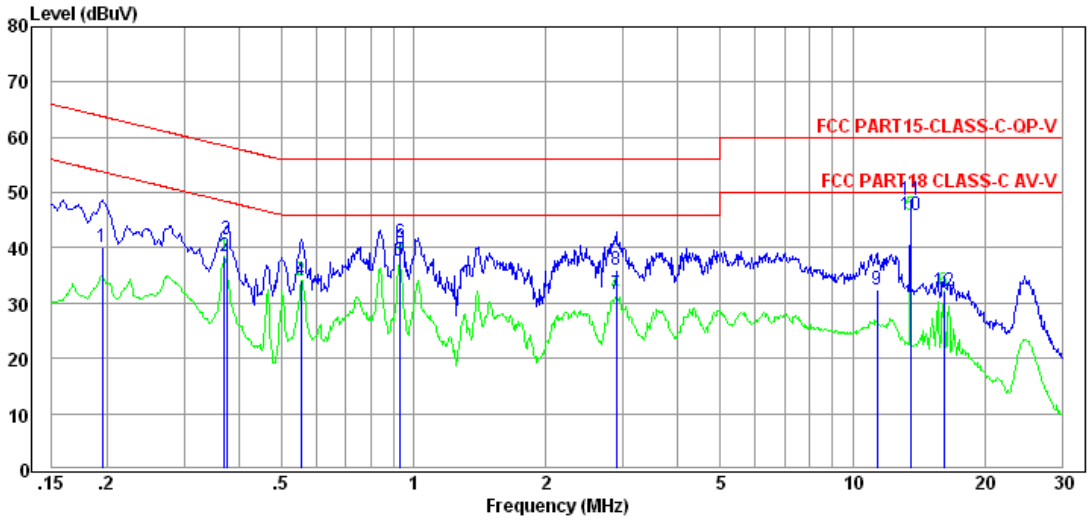
4.4.2 Test Description



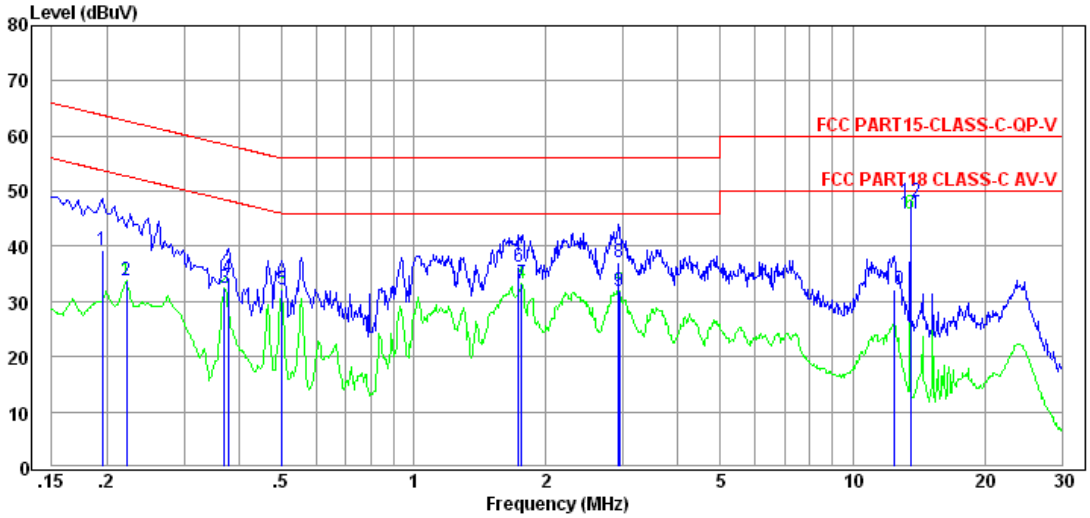
The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10-2013

4.4.3 Test result

Frequency (MHz)	Result (dBuV)	Limit Line (dBuV)	Margin (dB)	Phase line	Detector
0.20	40.00	63.80	23.80	L	QP
0.37	38.53	48.47	9.94	L	Average
0.38	41.47	58.39	16.92	L	QP
0.56	34.08	46.00	11.92	L	Average
0.93	37.57	46.00	8.43	L	Average
0.93	40.87	56.00	15.13	L	QP
2.90	31.52	46.00	14.48	L	Average
2.90	36.03	56.00	19.97	L	QP
11.38	32.38	60.00	27.62	L	QP
13.55	45.97	50.00	4.03	L	Average
13.55	48.55	60.00	11.45	L	QP
16.14	32.16	50.00	17.84	L	Average
0.20	39.35	63.80	24.45	N	QP
0.22	33.83	52.74	18.91	N	Average
0.37	32.51	48.47	15.96	N	Average
0.38	34.32	58.30	23.98	N	QP
0.50	32.22	46.00	13.78	N	Average
1.73	36.42	56.00	19.58	N	QP
1.76	33.21	46.00	12.79	N	Average
2.93	36.99	56.00	19.01	N	QP
2.95	32.03	46.00	13.97	N	Average
12.45	32.09	60.00	27.91	N	QP
13.55	45.99	50.00	4.01	N	Average
13.55	48.11	60.00	11.89	N	QP


Level (dBuV)
80
70
60
50
40
30
20
10
0
.15
.2
.5
1
2
5
10
20
30
Frequency (MHz)
FCC PART15-CLASS-C-QP-V
FCC PART18 CLASS-C AV-V

L line


Level (dBuV)
80
70
60
50
40
30
20
10
0
.15
.2
.5
1
2
5
10
20
30
Frequency (MHz)
FCC PART15-CLASS-C-QP-V
FCC PART18 CLASS-C AV-V

N line

4.5 Radiated Emission

4.5.1 Requirement

According to FCC section 15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

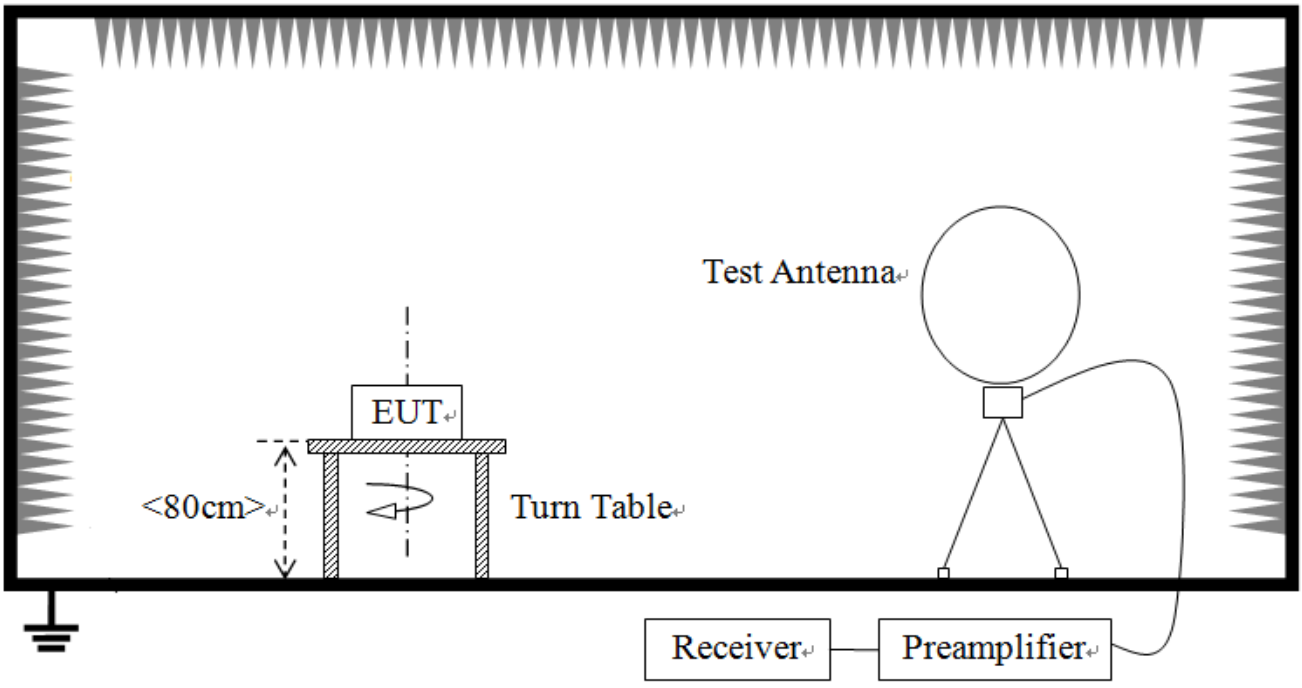
According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)	Limit(dBμV/m)	Detector
0.009-0.490	2400/F(kHz)	300	/	/
0.490-1.705	24000/F(kHz)	30	/	/
1.705-30	30	30	/	/
30 - 88	100	3	40	QP
88 - 216	150	3	43.5	QP
216 - 960	200	3	46	QP
960 - 1000	500	3	54	QP
Above 1000	500	3	54	AV

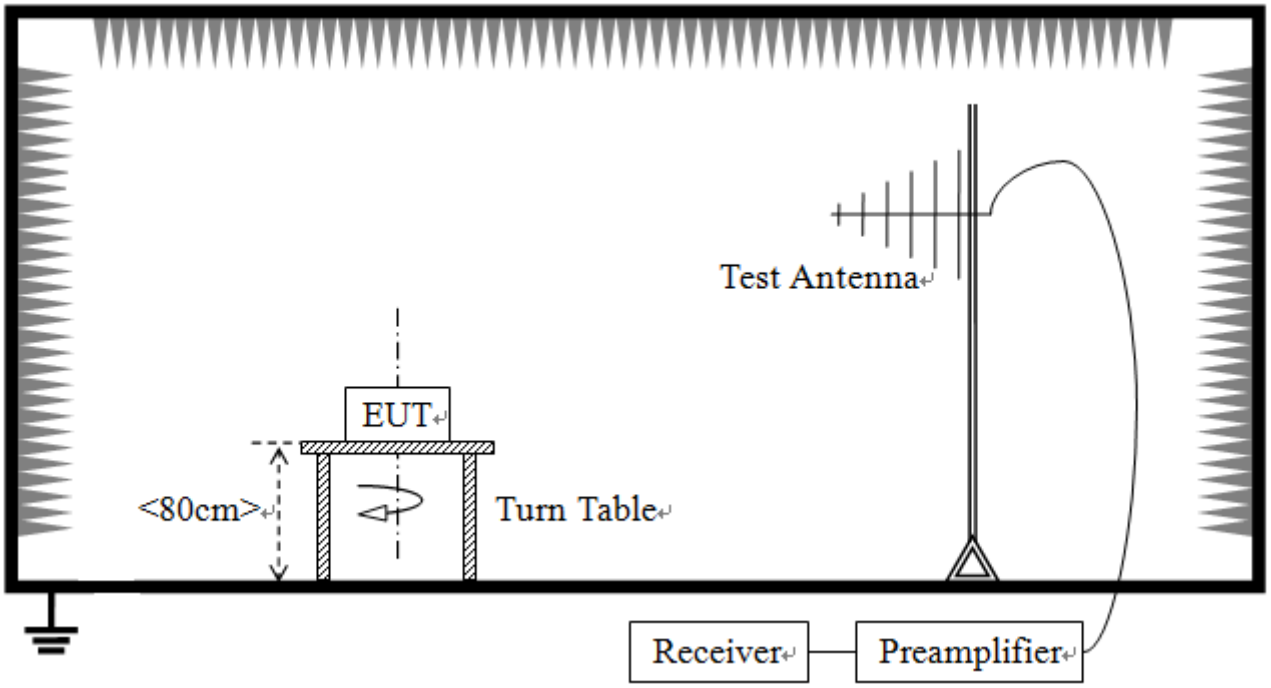
In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table)

According to FCC section 15.33(a)(1), if the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. So, Frequency range of radiated measurement is from 9kHz to 136MHz

4.5.2 Test setup



Radiated Emissions Below 30MHz



Radiated Emissions 30-1000MHz

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.10-2013. Below 1GHz, the EUT was set-up on insulator 80cm above the Ground Plane.Above 1GHz, the EUT was set-up on insulator 150cm above the Ground Plane.The set-up and test methods were according to ANSI C63.10

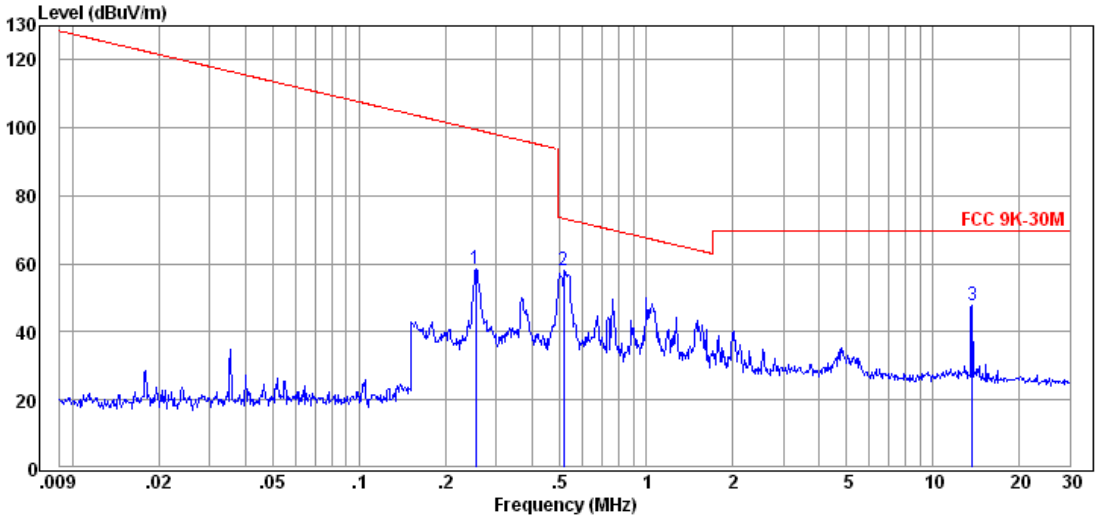
The EUT is powered by the Battery. The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the NFC Module is activated.

For the Test Antenna: In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) is used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength, the azimuth range of turntable was 0o to 360o, the receive antenna has two polarizations horizontal and vertical. When doing measurements above 1GHz, the EUT was placed within the 3dB beam width range of the horn antenna, and the EUT was tested in 3 orthogonal positions as recommended in ANSI C63.10 for Radiated Emissions and the worst-case data was presented.

4.5.3 Test Result

Radiated Emissions 9kHz – 30MHz

Freq MHz	Result dBuV	Limit dBuV	Margin dB	Detector
0.25	58.32	99.49	41.17	Peak
0.52	58.10	73.36	15.26	Peak
13.66	47.81	69.50	21.69	Peak



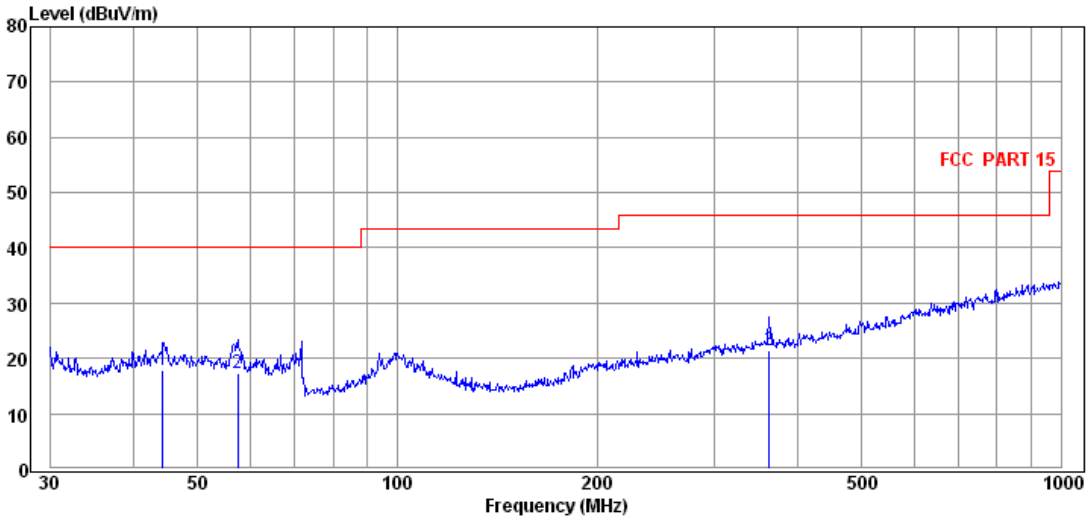
Note:

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

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

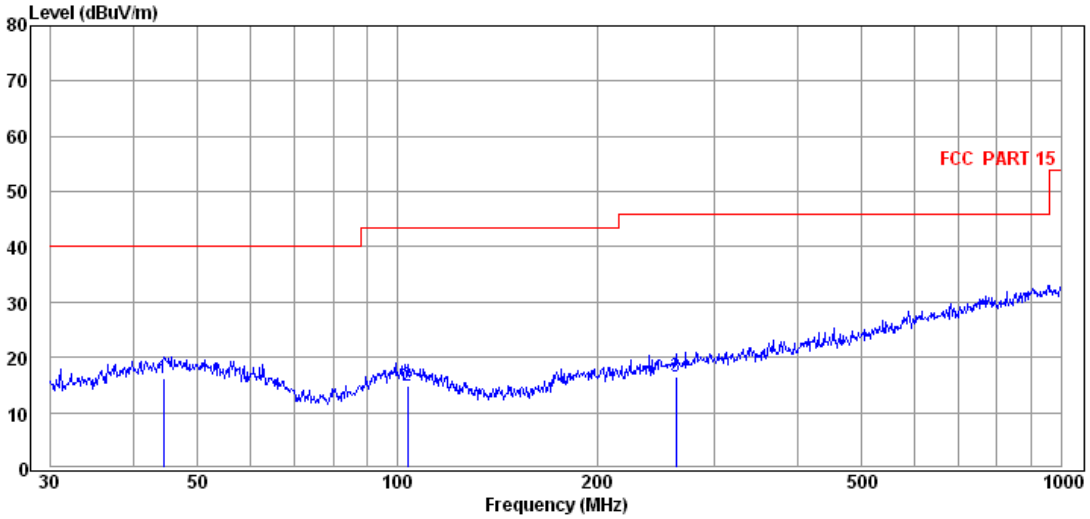
Radiated Emissions 30MHz-1GHz (Vertical)

Freq MHz	Result dBuV	Limit dBuV	Margin dB	Detector
44.28	17.74	40.00	22.26	QP
57.39	17.43	40.00	22.57	QP
362.98	21.48	46.00	24.52	QP



Radiated Emissions 30MHz-1GHz (horizontal)

Freq MHz	Result dBuV	Limit dBuV	Margin dB	Detector
44.43	16.14	40.00	23.86	QP
103.44	14.78	43.50	28.72	QP
262.90	16.48	46.00	29.52	QP

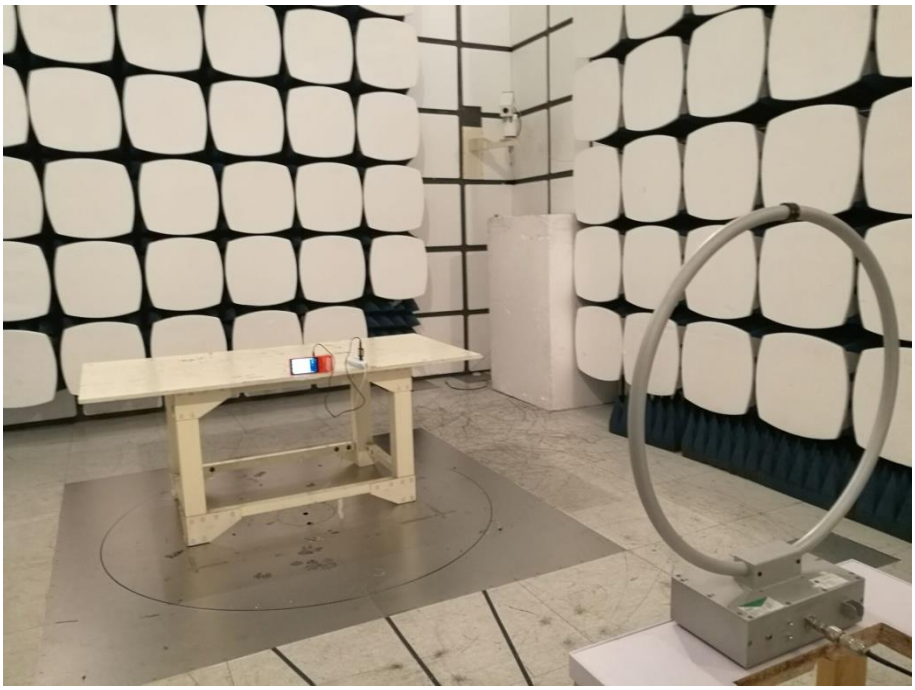


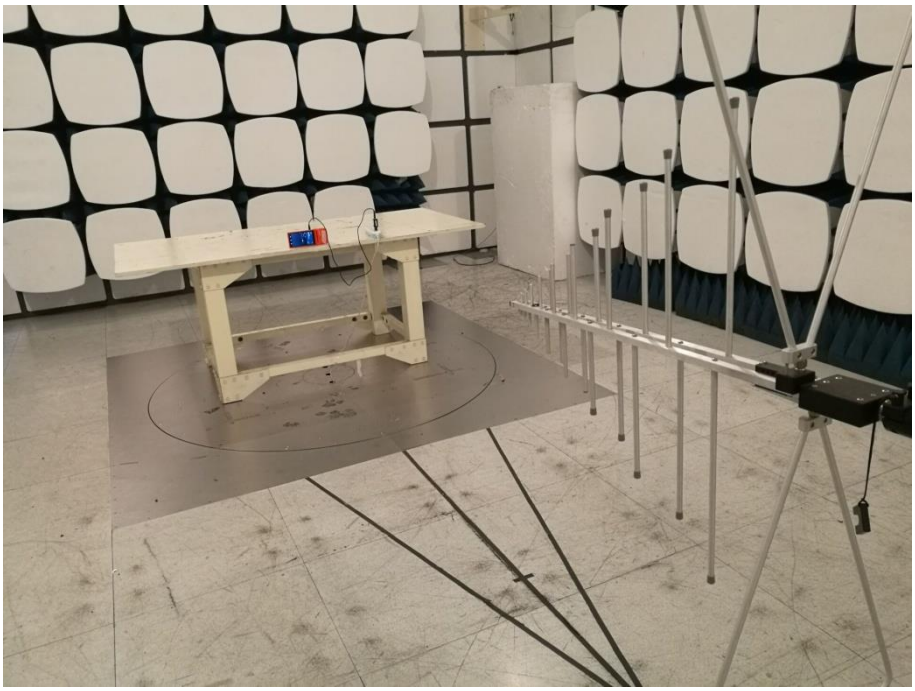
Annex A Photos of the EUT

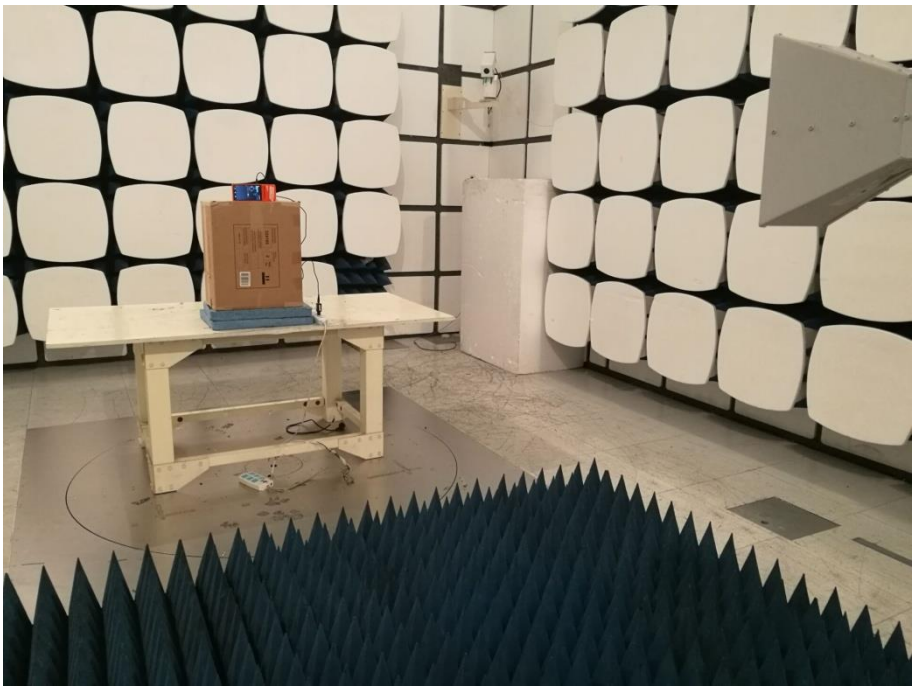
Annex B Photos of Setup

1. Conducted Emission

2. Radiated Emission







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