



NFCTESTREPORT

No.I19Z62374-IOT28

for

SAMSUNG Electronics Co., Ltd.

Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN

SM-S215DL

FCC ID:ZCASMA215U

with

Hardware Version:REV1.0

Software Version: S215DL.001

Issued Date: 2020-04-16

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I19Z62374-IOT28	Rev.0	1st edition	2020-04-16

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China100191

Location 2:CTTL(Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road,
Haidian District, Beijing, P. R. China100191

Location 3: CTTL(BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development
Area, Beijing, P. R. China 100176

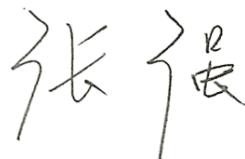
1.3. Testing Environment

Normal Temperature: 15-35°C
Extreme Temperature: -20/+50°C
Normal Relative Humidity: 20-75%
Normal Air Pressure 86Kpa-106Kpa

1.4. Project data

Testing Start Date: 2020-02-04
Testing End Date: 2020-03-16

1.5. Signature



Zhang Qiang
(Prepared this test report)



Pang Shuai
(Reviewed this test report)



Zhu Liang
(Approved this test report)

2. ClientInformation

2.1. Applicant Information

Company Name: SAMSUNG Electronics Co., Ltd.
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07058
City: /
Country: /
Contact: Jenni Chun
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Telephone: 1-973-808-6375

2.2. Manufacturer Information

Company Name: SAMSUNG Electronics Co., Ltd.
Address: Samsung R5, Maetan dong 129, Samsung roYoungtong gu, Suwon
city 443 742, Korea
City: /
Country: /
Contact: JP KIM
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Telephone: /

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN
Model name/HVIN	SM-S215DL
Brand name	SAMSUNG
FCC ID	ZCASMA215U
UMTS Frequency Band(s)	FDD I/II/IV/V/VIII
GSM Frequency Band(s)	GSM900/1800/1900/850
E-UTRA Frequency Band(s)	FDD01/02/03/04/05/07/08/12/13/17/20/25/26/28/66/71 TDD38/39/40/41
Extreme Temperature	10~55°C
Nominal Voltage	3.8V
Extreme High Voltage	4.4V
Extreme Low Voltage	3.5V

3.2. Internal Identification of EUT

EUT ID*	SN or IME	HW Version	SW Version	Date of receipt
/	/	REV1.0	S215DL.001	/

*EUT ID: is used to identify the test sample in the lab internally.

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters, referring to Annex A for detailed information, are supplied by the client or manufacturer, which are the bases of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
CFR 47 Part 2	Part 2—Frequency Allocations and Radio Treaty Matters; General Rules and Regulations.	2018
CFR 47 Part15	Part 15 — Radio Frequency Devices. Subpart C—Intentional Radiators. § 15.35Measurement detector functions and bandwidths. § 15.207 Conducted limits. § 15.209 Radiated emission limits, general requirements. §15.215Additional provisions to the general radiated emission limitations. §15.225 Operation within the band 13.110–14.010 MHz.	2018
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

5. Test Results

5.1. Summary of Test Results

Table 1: Summary of Test Results

No	Test Cases	Clause in Regulation	Section in This Report	Verdict
1	Electric Field Strength of Fundamental Emissions	CFR 47 § 15.225(a)	B.1	P
2	Electric Field Strength of Outside the Allocated Bands	CFR 47 § 15.225(b) CFR 47 § 15.225(c)		P
3	Electric Field Radiated Emissions	CFR 47 § 15.209	B.2	P
		CFR 47 § 15.225(d)	B.3	P
4	Frequency Tolerance	CFR 47 § 15.225(e)	B.4	P
5	20dB Bandwidth	CFR 47 § 15.215(c)	B.5	P
6	Conducted Emissions	CFR 47 § 15.207	B.6	P

The measurement is carried out according to ANSI C63.10. See **ANNEX B** for details.

Test Conditions:

For this report, all the test cases listed above were tested under normal Temperature, Voltage, humidity and Air Pressure except the Frequency Tolerance test case. The specific conditions of Frequency Tolerance test case are listed in section B.4.3

See Table 3 for terms for result verdict:

Table 2 Terms for result verdict

P	Pass, The EUT complies with the essential requirements in the standard.
NP	Not Perform, The test was not performed by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard

5.2. Statements

This model SM-S215DL is a variant product of the model SM-A215U; and all the tests are performed on SM-A215U.

The test cases listed in Section 5.1 of this report for the EUT specified in Section 3 were performed by CTTL according to the reference documents in Section 4.

The EUT meets all applicable requirements of the regulations and standards in Section 4.2.

6. Test Facilities Utilized

Table 3: Test Facilities Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL. DUE DATE	CAL. INTERVAL
1.	Spectrum Analyzer	RSA3408A	B010277	Tektronix	2020-09-26	1 Year
2.	Climatic chamber	SH242	93008658	ESPEC	2021-01-18	1 Year
3.	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	2020-05-16	1 Year
4.	H-field Antenna	HFH2-Z2	829324/007	R&S	2020-12-03	1 Year
5.	LISN	ENV216	101459	R&S	2020-04-10	1 Year
6.	Test Receiver	ESCI7	100948	R&S	2020-07-17	1 Year
7.	Test Receiver	ESU26	100376	Rohde & Schwarz	2020-10-30	1 Year
8.	BiLog Antenna	VULB9163	01176	Schwarzbeck	2020-03-14	1 Year

Note: The BiLogAntennawith series number 01176 was usedbefore Cal. Due Date.

7. Measurement Uncertainty

Table 4: Measurement Uncertainty

Item	Uncertainty
Frequency Tolerance	$U = 77 \text{ Hz, } k=2$
20dB Bandwidth	$U = 77 \text{ Hz, } k=2$
Radiated Emissions (<1GHz)	$U = 5.40 \text{ dB, } k=2$
Radiated Emissions (>1GHz)	$U = 4.32 \text{ dB, } k=2$
Conducted emission	$U = 3.10 \text{ dB, } k=2$

ANNEX A: EUTparameters

/

ANNEX B: Detailed Test Results

B.1. Electric Field Strength of Fundamental and Outside the Allocated bands

B.1.1. Reference

See Clause 4, Clause 5 of ANSI C63.10-2013 generally.

B.1.2. Measurement Methods

The transmitter carrier output levels (E-Field) from the EUT are measured in a semi-anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.0 meter above the ground. The E-field is measured with a shielded loop antenna connected to a measurement receiver. Detected E-field was maximized by rotating the EUT through 360° and adjusting the receiving antenna polarizations. The maximization processes were repeated with the EUT positioned respectively in its three orthogonal axes. The measurements were performed with the peak detector and if required, the quasi-peak detector.

The measurement bandwidth is:

Table B-1: Measurementbandwidth

Frequency of Emission (MHz)	RBW/VBW
12.56-14.56	10/30 kHz

The E-field measured at 3m is calculated as:

$$\text{E-field (dB}\mu\text{V/m)} = \text{Rx (dB}\mu\text{V)} + \text{CableLoss (dB)} + \text{AF@3m (dB/m)}$$

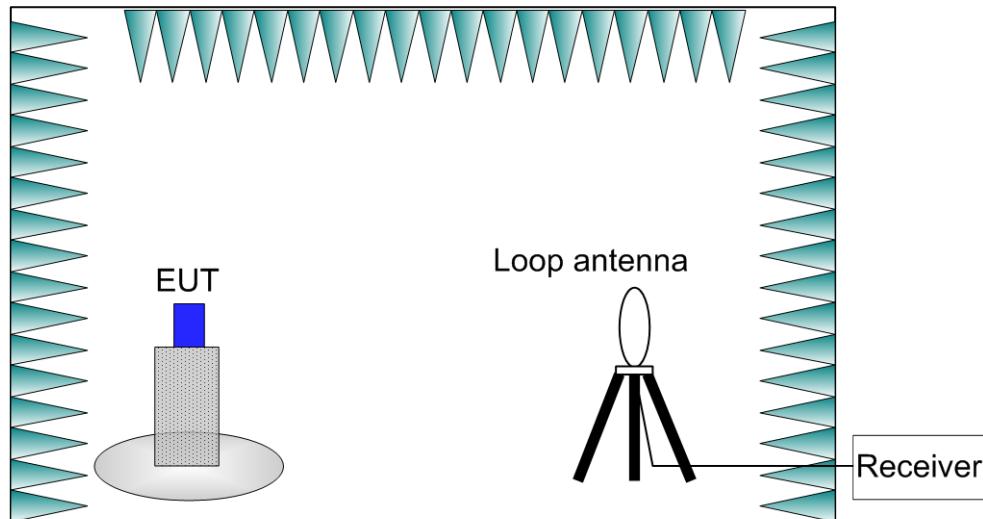


Figure B-1: Measurement Setup

B.1.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC

The EUT is powered by a travel adapter.

During the measurements, the ambient temperature of the electromagnetic anechoic chamber is in the range of 15 ~ 25 °C.

B.1.4. Limits

Table B-2: Limits

Frequency Range (MHz)	E-field Strength Limit @ 30 m (μV/m)	E-field Strength Limit @ 3 m (dBμV/m)
13.560 ± 0.007	+15,848	124
13.410 to 13.553		
13.567 to 13.710	+334	90
13.110 to 13.410		
13.710 to 14.010	+106	81

Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula:

$$\text{Extrapolation(dB)} = 40\log_{10}(\text{Measurement Distance}/\text{Specification Distance})$$

B.1.5. Measurement Results

Measurement results of normal conditions see Figure B-2 for different set-ups of EUT. The results displayed take into account applicable antenna factors and cable losses.

Conclusions:PASS.

RSE 15.225 12.56-14.56M

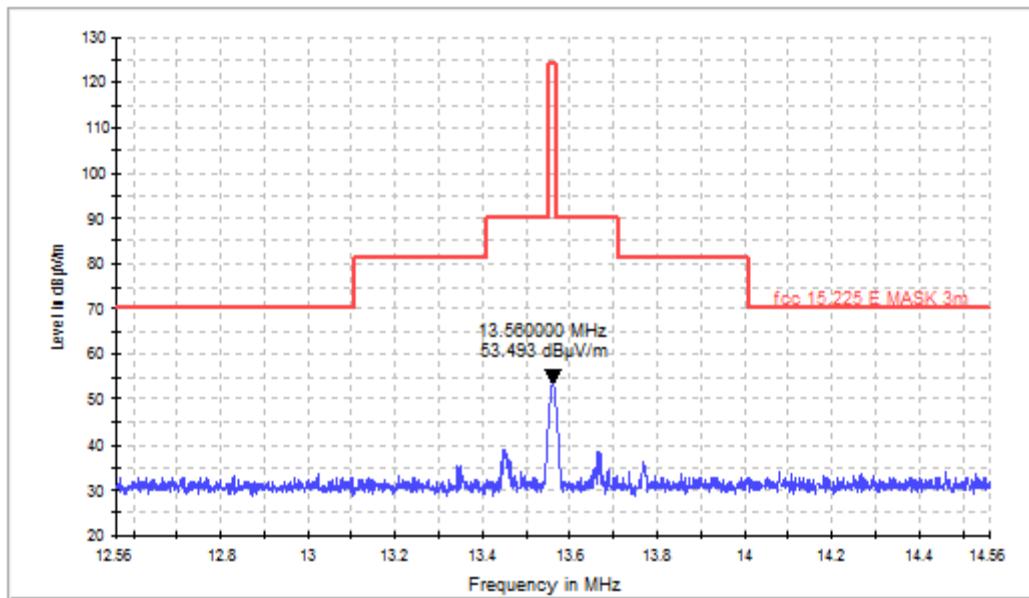


Figure B-2: Measurement results for Electric Field Strength of Fundamental and Outside the Allocated bands

B.2. Electric Field Radiated Emissions (< 30MHz)

B.2.1. Reference

See Clause 6.4 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

B.2.2. Measurement Methods

The transmitter carrier output levels (E-Field) from the EUT are measured in a semi-anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.0 meter above the ground. The E-field is measured with a shielded loop antenna connected to a measurement receiver. Detected E-field was maximized by rotating the EUT through 360° and adjusting the receiving antenna polarizations. The maximization processes were repeated with the EUT positioned respectively in its three orthogonal axes. The measurements were performed with the peak detector and if required, the quasi-peak detector.

The measurement bandwidth is:

Table B-3: Measurementbandwidth

Frequency of Emission (MHz)	RBW/VBW
0.009-0.15	100/300 Hz
0.15-30	10/30 kHz

The E-field measured at 3m is calculated as:

$$\text{E-field (dB}\mu\text{V/m)} = \text{Rx (dB}\mu\text{V)} + \text{CableLoss (dB)} + \text{AF@3m (dB/m)}$$

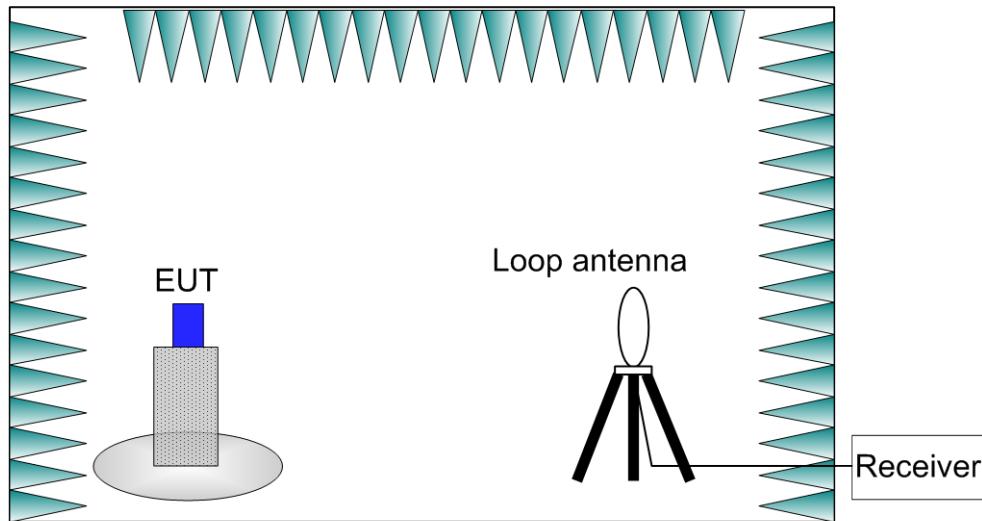


Figure B-3: Measurement Setup

B.2.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC

The EUT is powered by a travel adapter.

During the measurements, the ambient temperature of the electromagnetic anechoic chamber is

in the range of 15 ~ 25 °C.

B.2.4. Limits

Table B-4: Limits

Frequency Range (MHz)	E-field Strength Limit @ 30m (mV/m)	E-field Strength Limit @ 3m (dB μ V/m)
0.009-0.490	2400/F(kHz)	129-94
0.490-1.705	24000/F(kHz)	74-63
1.705-30	30	70

Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula:

$$\text{Extrapolation(dB)} = 40\log_{10}(\text{Measurement Distance}/\text{Specification Distance})$$

B.2.5. Measurement Results

Measurement results of normal conditions see Figure B-4 for different set-ups of EUT. The results displayed take into account applicable antenna factors and cable losses.

Conclusions: PASS.

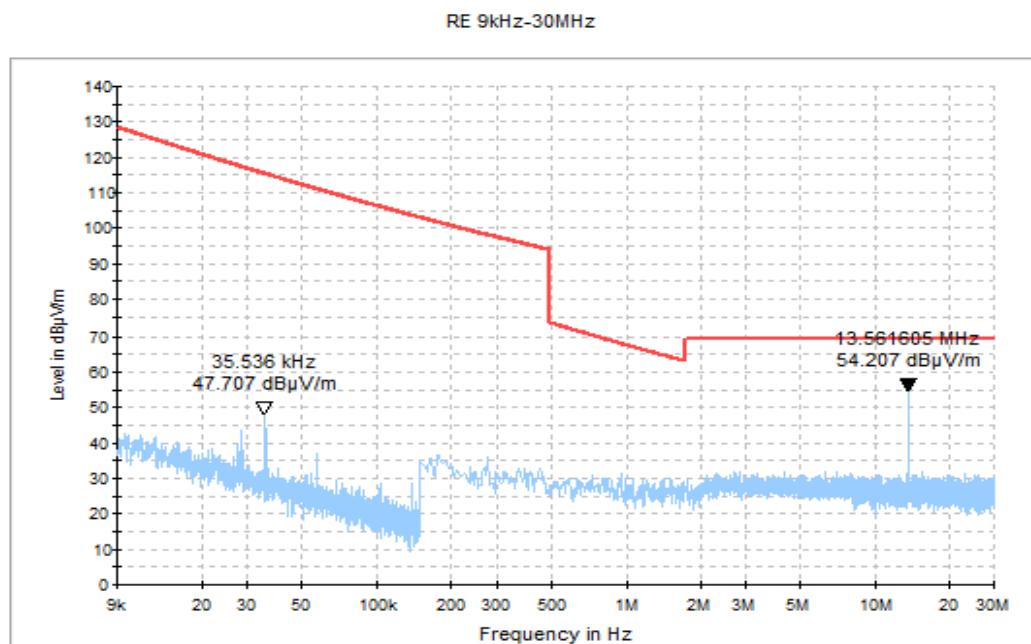


Figure B-4: Measurement results for Electric Field Radiated Emissions (< 30MHz)

B.3. Electric Field Radiated Emissions ($\geq 30\text{MHz}$)

B.3.1. Reference

See Clause 6.5 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

B.3.2. Measurement Methods

The electric field radiated emissions from the EUT are measured in a semi-anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The receiving antenna is connected to a measurement receiver. In order to search for maximum field strength emitted from the EUT, the receiving antenna can be moved between the height of 1.0 m to 4.0 m. The detected E-field was maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna positions for both vertical and horizontal antenna polarizations. The maximization processes were repeated with the EUT positioned respectively in its three orthogonal axes. The measurements were performed with the peak detector and if required, the quasi-peak detector.

The measurement bandwidth is:

Table B-5: Measurement bandwidth

Frequency of Emission (MHz)	RBW/VBW
30-1000	120kHz

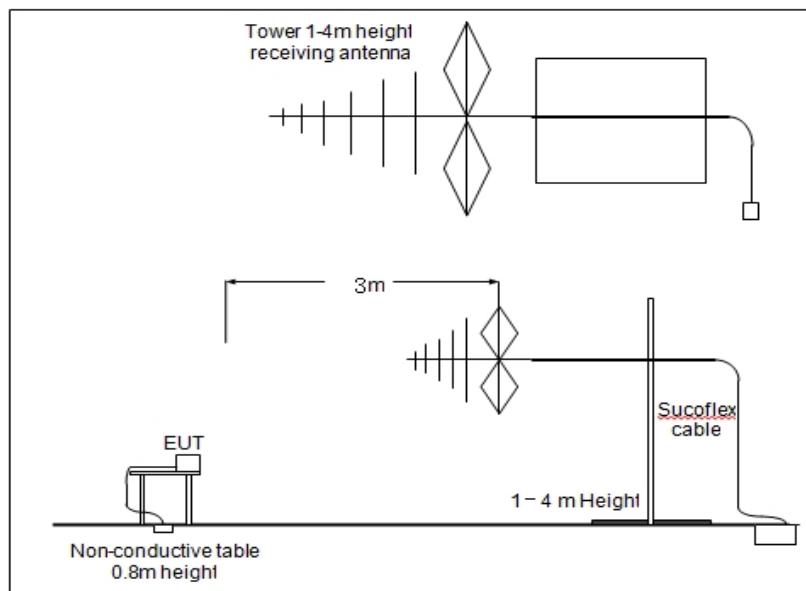


Figure B-5: Measurement Setup

B.3.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC

The EUT had been connected to a travel adapter.

During the measurements, the ambient temperature of the electromagnetic anechoic chamber is in the range of 15 ~ 25 °C.

B.3.4. Limits

Table B-6: Limits

Frequency Range	E-field Strength Limit	E-field Strength Limit	E-field Strength Limit

(MHz)	@ 3m (mV/m)	@ 3m (dB μ V/m)	@ 10m (dB μ V/m)
30-88	100	40	30
88-216	150	43.5	33.5
216-960	200	46	36
960-1000	500	54	44

B.3.5. Measurement Results

Measurement results of normal conditions see Figure B-6 for different set-ups of EUT. The results displayed take into account applicable antenna factors and cable losses.

Conclusions:PASS.

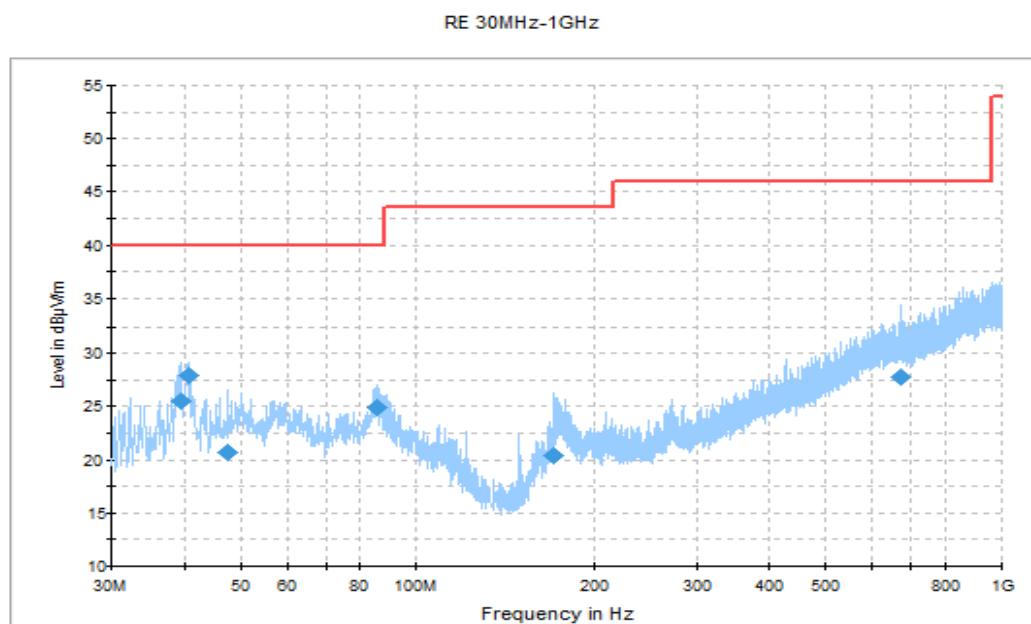


Figure B-6: Measurement results for Electric Field Radiated Emissions ($\geq 30\text{MHz}$)

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/
39.409000	25.4	110.0	V	17.0	-2.8	14.6	40.0
40.670000	28.0	110.0	V	-42.0	-2.5	12.0	40.0
47.557000	20.6	125.0	V	-4.0	-0.2	19.4	40.0
85.484000	24.9	100.0	V	-31.0	-5.2	15.1	40.0
171.03800	20.4	100.0	V	3.0	-4.2	23.1	43.5
669.71500	27.7	125.0	H	-4.0	9.1	18.3	46.0

B.4. Frequency Tolerance

B.4.1. Reference

See Clause 6.8 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

B.4.2. Measurement Methods

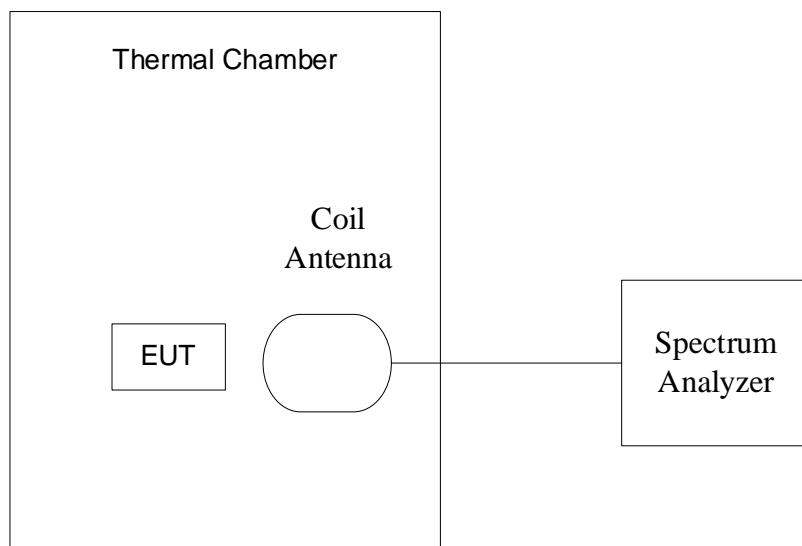


Figure B-7: Measurement Setup

The transmitter output signal was picked up by coil antenna connected to the spectrum analyzer. The center frequency was measured with 30Hz RBW and 1kHz span.

During the test, the EUT was placed in a thermal chamber until thermal balance and lasting appropriate time.

B.4.3. EUT Operating Mode and Test Conditions

The measurement of EUT was carried out under the transmit state of without modulation.

EUT had not been connected to a travel adapter. The frequency stability was measured with the different voltage and temperature combinations:

- The nominal voltage 3.8V (See 3.1) was used and the temperature was varied from -20°C to +50°C in 10°C increments using an environmental chamber.
- The 20°C was used and the voltages were 3.5V, 3.85V and 4.4V (The extreme low voltage, the nominal voltage and the extreme high voltage defined in section 3.1).

The details were as following:

Table B-7: Combinations of Voltage and Temperature

Test items	Voltage	Temperature
Frequency stability with respect to ambient temperature	3.8V	-20°C
		-10°C
		0°C
		10°C

		20°C
		30°C
		40°C
		50°C
Frequency stability when varying supply voltage	3.5V	20°C
	3.8V	
	4.4V	

B.4.4. Test Layouts

See B.4.2.

B.4.5. Limits

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

B.4.6. Measurement Results

Measurement results see Table B-8 for different test conditions.

Conclusions:PASS.

Table B-8: Measurement results for Frequency Tolerance

Temperature	Voltage	Frequency (MHz)			
		Startup	2 Min Later	5 Min Later	10 Min Later
-20°C	3.8V	13.5598821	13.5598751	13.5598731	13.5598721
-10°C	3.8V	13.5598861	13.5598921	13.5598931	13.5598941
0°C	3.8V	13.5598951	13.5598941	13.5598921	13.5598901
10°C	3.8V	13.5598831	13.5598761	13.5598701	13.5598651
20°C	3.8V	13.5598561	13.5598442	13.5598382	13.5598332
30°C	3.8V	13.5598202	13.5598062	13.5598002	13.5597972
40°C	3.8V	13.5597862	13.5597742	13.5597722	13.5597682
50°C	3.8V	13.5597612	13.5597562	13.5597522	13.5597502
20°C	3.5V	13.55983875	13.55983475	13.559826875	13.559820625
20°C	3.8V	13.5598561	13.5598442	13.5598382	13.5598332
20°C	4.4V	13.55979125	13.559796875	13.5598075	13.55981125

Temperature	Voltage	Frequency Error (%)			
		Startup	2 Min Later	5 Min Later	10 Min Later
-20°C	3.8V	-0.001	-0.001	-0.001	-0.001
-10°C	3.8V	-0.001	-0.001	-0.001	-0.001
0°C	3.8V	-0.001	-0.001	-0.001	-0.001
10°C	3.8V	-0.001	-0.001	-0.001	-0.001
20°C	3.8V	-0.001	-0.001	-0.001	-0.001
30°C	3.8V	-0.001	-0.001	-0.001	-0.001
40°C	3.8V	-0.002	-0.002	-0.002	-0.002

50°C	3.8V	-0.002	-0.002	-0.002	-0.002
20°C	3.5V	-0.001	-0.001	-0.001	-0.001
20°C	3.8V	-0.001	-0.001	-0.001	-0.001
20°C	4.4V	-0.002	-0.001	-0.001	-0.001

B.4.7. Measurement Uncertainty

Measurement uncertainty: $U = 77\text{Hz}$, $k=2$

B.5. 20dB Bandwidth

B.5.1. Reference

See Clause 6.9 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

B.5.2. Measurement Methods

The transmitter output signal was picked up by coil antenna connected to the spectrum analyzer. The bandwidth of the center frequency was measured with 140Hz RBW, 420Hz VBW and 14kHz span.

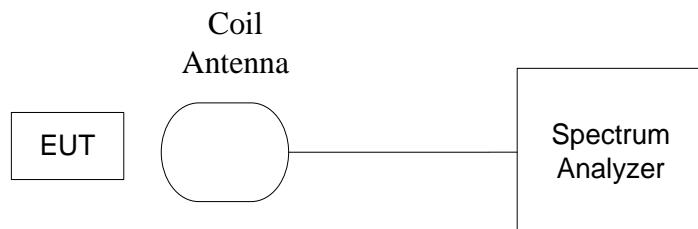


Figure B-8: Measurement Setup

B.5.3. EUT Operating Mode and Test Conditions

The measurement of EUT was carried out under the transmit state of NFC. EUT had not been connected to a travel adapter.

During the measurements, the ambient temperature was in the range of 15 ~ 25 °C.

B.5.4. Test Layouts

See B.5.2.

B.5.5. Limits

The 20dB bandwidth shall be less than 80% of the permitted frequency band. For 13.56 MHz NFC, the permitted frequency band is 14kHz, so the limit is 11.2 kHz.

B.5.6. Measurement Results

Measurement results see Figure B-9.

Conclusions:PASS.

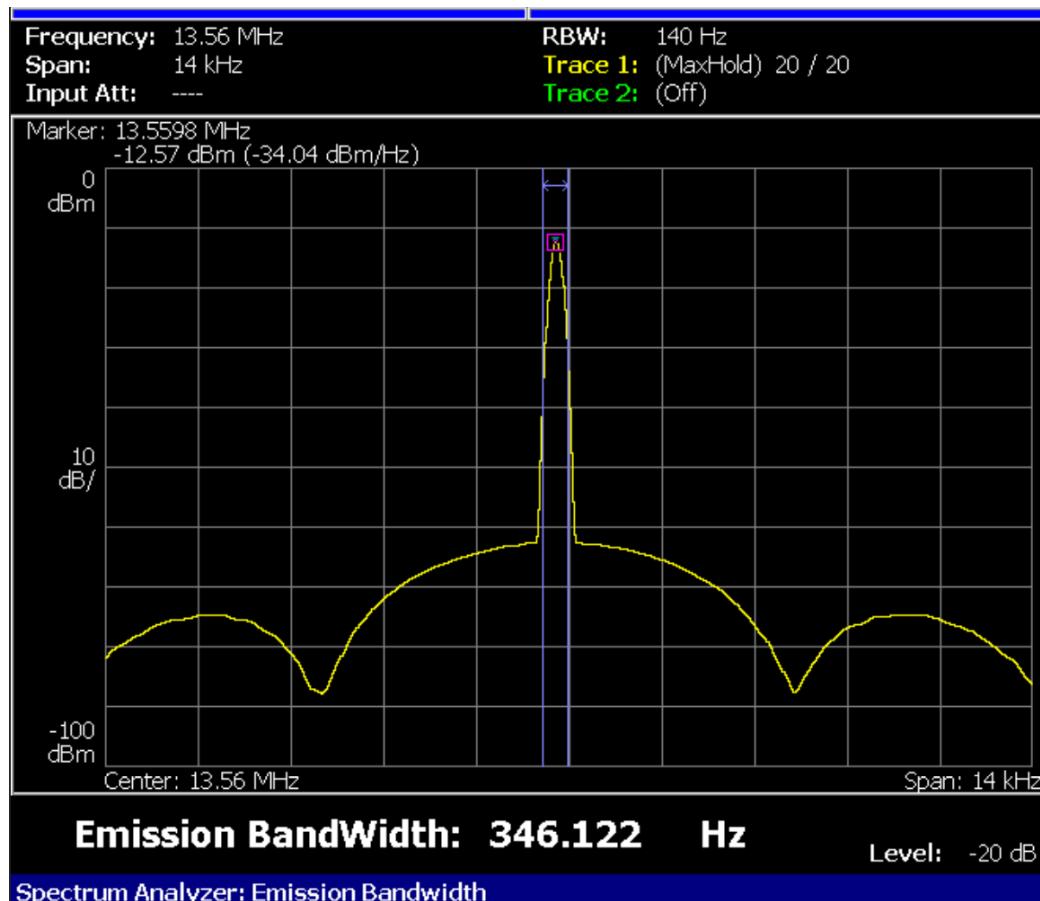


Figure B-9: Measurement results for 20dB Bandwidth

B.5.7. Measurement Uncertainty

Measurement uncertainty: $U = 77 \text{ Hz}$, $k=2$

B.6. Conducted emission

B.6.1. Reference

See Clause 6.2 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

B.6.2. Measurement Methods

The conducted emissions from the AC port of the EUT are measured in a shielding room. The EUT is connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection was performed. The measurements were performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver:
 Quasi-Peak/ AverageDetector.

The measurement bandwidth is:

Table B-9: Measurement Bandwidth

Frequency of Emission (MHz)	RBW/VBW
0.15-30	9kHz

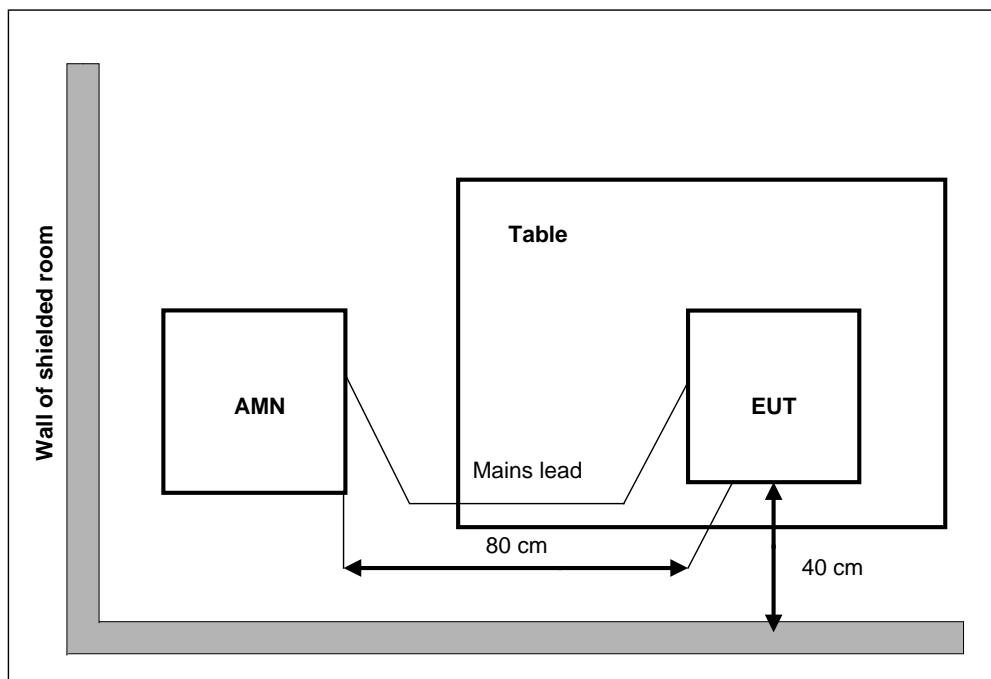


Figure B-10: Measurement Setup

B.6.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC.

The EUT is powered by a travel adapter.

During the measurements, the ambient temperature is in the range of 15 ~ 25 °C.

B.6.4. Limits

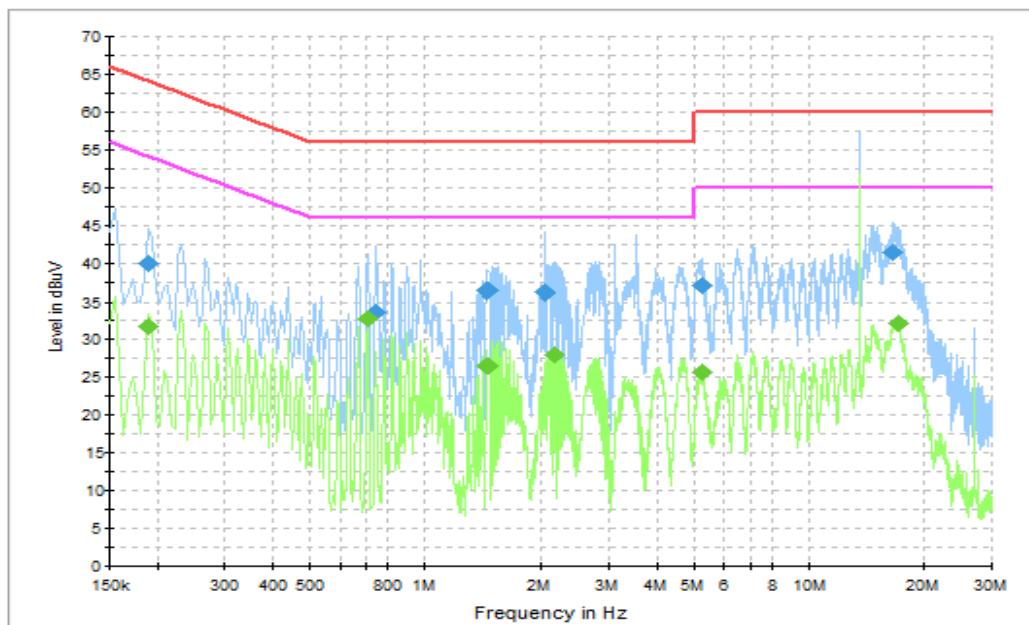
Table B-10: Limits

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Average Limit (dB μ V)
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

B.6.5. Measurement Results

Measurement results see Figure B-11.

Conclusions: PASS.



**Figure B-11: Measurement results for Conducted Emission
Final Result 1**

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.190500	39.9	10000.0	9.000	L1	20.0	24.2	64.0
0.748500	33.7	10000.0	9.000	L1	20.0	22.3	56.0
1.455000	36.4	10000.0	9.000	L1	19.8	19.6	56.0
2.040000	36.2	10000.0	9.000	L1	19.8	19.8	56.0
5.221500	37.0	10000.0	9.000	L1	19.8	23.0	60.0
16.566000	41.3	10000.0	9.000	L1	20.0	18.7	60.0

Final Result 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.190500	31.8	10000.0	9.000	L1	20.0	22.3	54.0
0.708000	32.7	10000.0	9.000	L1	20.0	13.3	46.0
1.455000	26.6	10000.0	9.000	L1	19.8	19.4	46.0
2.161500	27.9	10000.0	9.000	L1	19.8	18.1	46.0
5.226000	25.6	10000.0	9.000	L1	19.8	24.4	50.0
17.196000	32.1	10000.0	9.000	L1	20.0	17.9	50.0

ANNEX C: Persons involved in this testing

Table C-1: Persons involved

Test Item	Tester
20dB Bandwidth	Pang Shuai
Frequency Tolerance	Pang Shuai
Electric Field Strength of Fundamental and Outside the Allocated bands	Yang Fei,Zhao Wenhui
Electric Field Radiated Emissions (< 30MHz)	Yang Fei,Zhao Wenhui
Electric Field Radiated Emissions ($\geq 30\text{MHz}$)	Yang Fei,Zhao Wenhui
Conducted Emissions	Guo Qian

ANNEX D: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT

Beijing
China

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

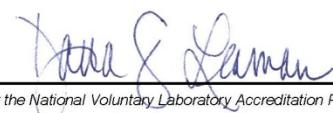
*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2019-09-26 through 2020-09-30

Effective Dates



For the National Voluntary Laboratory Accreditation Program



*****END OF REPORT*****